Food Manufacture

Incorporating Canning, Packing, and Preserving

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Manchester.

UNDER ORDINARY conditions, November in Manchester does not sound a particularly attractive proposition. The time of the year, the industrial dejection, and the climatic rigours of the North are not calculated to arouse enthusiasm. We admit, of course, there are powerful compensations. There is, for instance, Lancastrian hospitality, and the prospect of having a "bit of hot pot" is not to be treated lightly.

This, however, is no ordinary occasion. We are glad this year's Canners' Convention is being held in Manchester. It will be good for both canners and Manchester. We feel sure that the cheery optimism of a young, vigorous industry will come as a rousing tonic to sorely tried Lancastrians, and will do much to dispel the gloom of November, 1931.

Fireworks.

That we have in British canning a young, vigorous industry needs no emphasis here, for we have had more than one treat of journalistic fireworks in the daily press of late. That is all to the good, so long as it is not overdone. There have been occasions when similar displays have been little more than fireworks, but in this case there is a substantial background. One has only to visit some of the new canneries to be convinced, or, as we did recently, see something of the work that is being done at the Campden Research Station under the able direction of Mr. Hirst. We have no hesitation in saying that Campden now compares very favourably with any similar station in the world, including Berkeley. So much could not be claimed a couple of years ago, when we tried to arouse interest in this direction by advocating equipment of the station on factory lines and a vigorous policy of getting down to "brass tacks" by carrying out *technical* research directly bearing on practical and everyday problems. But things have changed since those days, and we feel sure that the credit is mainly due to Mr. Hirst, with the co-operation of Mr. Adam and the canners at large; and that he has now, as he fully deserves to have, their confidence and whole-hearted support is beyond question. Everything and everybody are now "set" for a bright future.

Canning Progress.

Perhaps the best way of gauging the last few years' progress of British canning on the technical side is to pass rapidly under review the work accomplished and in hand under Mr. Hirst's direction at Campden. There is, of course, another equally important side—namely, the extraordinarily rapid development of canning machinery and equipment—but the reader will, by visiting the display at the Manchester exhibition and by casting his eye over our notes in this and last month's issues, have a very good idea of what this development consists.

Blown Cans.

In May of last year Hirst and Adam produced *Canners' Bulletin* No. 1, which discussed very fully the question of causes underlying the formation of springers, hydrogen swells and perforations in canned fruits. A review of this and of *Bulletin* No. 2, which appeared in June of the same year, was given in FOOD MANUFACTURE, October, 1930. *Bulletin* No. 1 was extremely helpful to the canners in giving advice as to how they may best guard against loss from blown cans; by, for instance, setting the syrupers to allow a good headspace in the cans, seeing that the temperature of the contents of the cans before closing is sufficiently high (155° to

170° F.), and that the cooling is adequate (90° F. and under), and, most important of all, that the temperature of the storage room for filled cans is kept as low as possible.

This work is still in progress, and particular attention is being given to the development of blown cans on storage at temperatures likely to be experienced in tropical or sub-tropical countries. Experiments are being carried out in which the various factors involved are varied in turn, and it is hoped that when sufficient data have been accumulated it will be possible to state the conditions of processing which will minimise the loss from blown cans.

Syrup for Canning.

Bulletin No. 2 dealt with the use of sugar syrup in fruit canning. After discussing the subject in a general way, it proceeded to a detailed consideration of practical matters relating to the various forms of hydrometers, density measurement and temperature correction, the function and use of sugar, and so on. Some extremely useful tables were included.

Peas and Fruits for Canning.

More recently, in May of the present year, a third *Bulletin* appeared. This dealt with the varieties of fruits suitable for canning, and, after examining the characteristics of good canning varieties and the size of canneries in relation to fruit production, gave much useful information of a practical nature concerning the choice of suitable canning varieties for each of the common fruits and the correct procedure in canning operations.

Similar information relating to peas was given by Hirst and Adam in a paper published in the April issue of the *Journal of the Ministry of Agriculture*.

This type of work is being extended to embrace other vegetables and fruit, such as cherries and cultivated blackberries. Also, tests are in progress on the cold storage of fruits, and we were agreeably surprised to see the thorough way in which this work is being carried out.

This does not by any means complete the list of investigations on the Campden programme; we have not mentioned the absorption of lime in blanching peas with hard water nor the study of thermophilic organisms causing the flat souring of peas, but sufficient has been said to demonstrate the important rôle which Campden is playing in the march forward of the British canning industry.

Meat and Fish.

Now that Campden has been so nicely launched to pilot the fruit and vegetable canning industry through the intricacies of technology, one's thoughts naturally turn to the related subject of fish and meat canning and preserving generally. What is being done to provide these industries with a centre for information, investigation, and instruction on lines similar to those established at Campden, Stavanger in Norway, Wesermünde in Germany, Halifax and Prince Rupert in Canada, and Berkeley, Chicago, Washington, and Seattle in U.S.A.? So far as we know, nothing at all has been done. No words, except unprintable ones, can express our feelings in the matter. The invigorating and accelerating effects which such a station would have on the meat and fish industries of this country are enormous. Perhaps, after all, it is a pity to disturb this peaceful slumbering by rude language!

Frozen Fruits.

Practically all articles, bulletins, papers, and so forth recording technical work on food manufacture find their way into the editorial office. They come from nearly every part of the world, including China and Hawaii, and they are examined, classified, and filed according to subject. We have before us one of these files labelled "Frozen Fruit," and it contains a score or more papers which have been published during the past two years, chiefly in the United States. Glancing through these, one is impressed by the mass of opinions and information, some of undoubted value, which has been turned into print—evidently inspired by high hopes and genuine enthusiasm. But it is evident also that enthusiasm has outstripped the orderly advance of sound knowledge, or, as Mr. C. Mann puts it, "the dreamed-of possibilities of cold pack processing have become the victim of emotional disorders on the part of the packers instead of the brain child of intelligent men."

This does not mean to say that there are not important commercial possibilities in cold pack practice. That there are is apparent from the fact that on July 1 the U.S. Department of Agriculture opened its Frozen Pack Laboratory at Seattle. This laboratory will be under the directorship of H. C. Diehl, and has been well equipped for technical research into the many problems which have to be worked out before the new industry can consolidate itself.

The researches will extend over a wide field if they are to embrace all the varied factors which enter into this branch of fruit and vegetable preservation. For example, to name only a few, there are questions relating to choice of the most suitable varieties for freezing and there are questions concerned with harvesting procedure. Then there are problems relating to sorting, cleaning, pre-cooling, and freezing times and temperatures, packaging, distribution, and the influence of yeasts, moulds, and bacteria. All these, and others, influence colour, texture, flavour, and spoilage, and it is not difficult to visualise the

enormity of the task which the new research station has set itself.

As remarked above, similar work is in progress at Campden, and no doubt, between the two stations, it will not be long before a solid and lasting foundation to the frozen fruit industry is laid down.

British Peach Canning?

The Californian Bureau of Commerce has been investigating the possibilities of shipping preserved fresh fruits to Germany for use there in canneries, marmalade making factories, etc. It appears that surpluses of fruits are becoming a matter of grave concern to California fruit growers, and new or wider outlets are urgently needed. Sulphur dioxide would be used as a preservative, and this would be boiled out before canning. It is understood that the Bureau has arranged for a trial shipment of California cling peaches to Germany.

New Sardine Canning Process.

J. M. Devers in *The Canner* (May 2, 1931) gives a note on the development of a new process for canning sardines.

With the old process, as used in California, the fish were dried after being cleaned and then pre-cooked in oil or brine tanks, after which they were set aside for several hours for cooling and firming before being packed in cans. With this practice the oil remaining in the fish becomes slightly rancid, giving a flavour to the finished product which is very distasteful to the domestic trade.

The new process permits the fish to be packed while in a raw state, giving a very palatable flavour at the end of the process. The method is to pack the fish in the cans as soon as they are cleaned. They are then pre-cooked in steam at a high temperature, which breaks down the oil cells, after which the cans are tilted to drain out the surplus oil and water.

Following this, a further cook is given by baking with dry heat ranging from 250 to 325°. This releases the remaining surplus water and oil, which is drained off as the cans emerge from the baking process. This dry heat cook leaves the meat firm and hardens the skin enough so that it will not slip from the fish.

The sauce is then added, the cans closed and given the necessary retort sterilisation.

Formic Acid in Sugar.

Recently it has been found that samples of soft sugar imported from America to Bristol and Cardiff contained relatively large amounts of formic acid—amounts in the order of 1,000 parts per million. As most food manufacturers know formic acid and formaldehyde are preservatives and are prohibited under the Act of 1925, this discovery opens up an interesting speculation. Was the formic acid added intentionally to prevent the development of sugar pests, or was it due to some process in the manufacture of the sugar? If the former supposition is correct the Customs authorities are required to prohibit the entry of the sugar into this country, but whether they would be justified in prohibiting sugar containing small amounts of formic acid on these grounds is doubtful, as the intentional addition would be very difficult to prove. When sugar is heated formic acid is produced in small quantities, and enquiries made by the medical officer of the Port of Bristol indicated that traces of formic acid exist in most raw sugars; moreover, these traces may become concentrated during the various processes of refining. The manufacturers of the sugar in question were communicated with and emphatically denied any intentional addition of formic acid or any of its derivatives. It has been known for some time that formaldehyde may be found in boiled sweets as a result of the decomposition of the sugar and, therefore, its presence in small amounts is no proof that it has been added intentionally as a preservative. There are some cases which have to be dealt with in accordance with the 1925 Regulations, where the detection of a forbidden preservative in a product—such as benzaldehyde in almond paste or formaldehyde in boiled sweets—is no proof of added preservatives, and nothing short of catching the manufacturer actually putting in the forbidden substance would constitute a case. The ways of the public analyst are indeed hard and he has to tread very carefully in some directions.

Vitamins in Canned Foods.

An interesting study of the vitamin content of various canned vegetables has been reported by Kohman, Eddy, and Gurin (*Ind. Eng. Chem.*, vol. 23, p. 7, 1931). The vegetables investigated were turnip greens, head lettuce, celery (bleached and green), and raw carrots, both whole and shredded. It was found that canned turnip greens, like other leafy vegetables, are rich in vitamin A, being comparable in this respect with spinach. More vitamin A is supplied by 25 mgs. of turnip greens than by 5 gms. of bleached celery, and as much as 500 mgs. of unbleached celery. Canned turnip greens, head lettuce, and celery are not rich sources of vitamin B. There is more of the B2 (G) fraction than the B1 fraction in canned turnip greens. Head lettuce is superior to both celery and canned turnip greens in its content of the vitamin B complex. It is generally accepted that raw vegetables are always potent sources of vitamin C, but head lettuce, celery, and raw carrots were found to be surprisingly low in this factor compared with turnip greens. Two to 4 gms. of turnip greens gave better growth and less evidence of scurvy than 5 gms. of celery, green or

bleached, 10 to 15 gms. of head lettuce, or 10 gms. of whole or 15 gms. of shredded carrots.

Our knowledge of the various vitamins is steadily growing, and the list is now no longer limited to five. An American contemporary journal recently published a vitamin alphabet which included, in addition to the well known A to E principles, two more, F and G. F is stated to be present in liver and lettuce and aids growth, and G, which is found in milk, meat, and yeasts, prevents pellagra. It is quite likely that as time goes on further separations and distinctions may be made and a much longer list compiled.

Bleaching of Flour.

The Annual Report of the Ministry of Health, by Sir George Newman, which was published in September, contains many interesting points, one of which relates to flour bleaching. We have frequently referred to the question of flour bleaching; in particular, last October we discussed the rôle of carotin under the heading "To Bleach or not to Bleach?" Sir George now refers to the part played by carotin as a vitaminogen (when ingested it leads to the production of vitamin A in the liver). He states that it is generally accepted that the function of vitamin A is primarily that of a protective agent against bacterial infection, and if it should prove to be the case that the greater part of the flour sold in this country has had its "protective" qualities reduced by over 30 per cent., as a result of artificial bleaching, it may be necessary to reconsider the whole question of the treatment of flour with chemical substances.

This is virtually what we said a year ago, but it is not altogether satisfactory. As every flour miller knows, flour bleaches naturally—by what the miller calls "ageing." There is no doubt about that, and if a consumer gets flour which is several months old it may be as much bleached naturally as the average flour bleached with nitrogen peroxide or chlorine. The bleaching of flour is prohibited on the Continent and also in English National Mark flour. We have no doubt at all that millers in general would not mind if bleaching were entirely prohibited. The practice was started in order to meet a public demand and to enable the English miller to compete with American flour which had aged (and hence bleached) on the voyage, which took longer in those days than now. It seems to us that the investigations which are to be carried out to assist Sir George Newman in his further recommendations will need to be very carefully thought out, as in all cases which depend on a biological assay there are many pitfalls, and erroneous conclusions may easily be drawn from experimental data. Such millers as we have spoken to all say they would not mind stopping bleaching if every other miller in the country would do so, and if some check on imported flour were instituted. At that we will leave it to Sir George Newman and his investigators, firmly convinced that in another year's time there will be no change to report.

Fumigation of Foods

Reference is made in Sir George Newman's Annual Report to the danger arising from excessive adsorption of hydrocyanic acid used for fumigating foods. Contrary to the view hitherto accepted, it is not glucose which is the agent mainly responsible for retaining the prussic acid, but lævulose. This is a subject to which we have made frequent reference in FOOD MANUFACTURE, and the position at present is rather obscure. The analytical methods for determining residual cyanides are not very satisfactory, and the best seems to be the one where syrupy phosphoric acid is dropped into an aqueous extract of the substance and the liquid then distilled into caustic soda. Potassium iodide is used as an indicator and the distillates, which are collected in 200 c.c. portions, are titrated against N/50 silver nitrate. The end point is very difficult to determine, considerable practice is required, and we have come across numerous discrepancies amongst different workers.

The fears expressed by Sir George Newman are hard to reconcile with the report by Dr. Monier Williams on "The Effect on Food of Fumigation with Hydrogen Cyanide," to which we made reference in the March, 1931, issue of FOOD MANUFACTURE. The latter authority stated that there was no reason why a maximum of 20 parts per million should be exceeded, and, in general, foods retain less than 20 parts per million. Attention is drawn to the use of ethylene oxide, which is reported to be of low toxicity, combining readily with water to form ethylene glycol. It is stated to be quite harmless and to leave no taint when applied to foods. It has been found that this substance affects adversely the germinating properties of cereals and other seeds. This, of course, might be an advantage in the case of wheat which is meant for milling and not for seed purposes, as germination is undesirable, but it would not be suitable for barley intended for malting.

Ethylene oxide, in conjunction with liquid carbon dioxide, is being used for fumigation of food stores and factories, but it is still in the experimental stage, though we understand that at least one large London flour mill has been fumigated recently by this process.

We feel that much more work on the subject is necessary, and would like to see definite evidence of any poisoning cases arising from retained cyanides in foods which had been exposed to prussic acid. So far we have not heard of any.

Examination of Canned Fruits, with Special Reference to Quality

By F. HIRST, M.Sc., A.R.C.Sc.,
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The consumer passes the final judgment on the quality of canned foods, and it is therefore of the greatest importance that the canner should study the public taste. The questions of nutritional value, vitamins, and general suitability for human consumption are also essential aspects of the situation. As all these factors are of practical value to the canner, especially at the present state of development of the fruit canning industry in this country, the author discusses some of the chief points in this connection.

What the Public Wants.

IT IS always a difficult problem to gauge the public fancy, and this is made more complicated by the fact that the fancy is not static but is concentrated now on one class of product and now on another. There is little doubt that the consuming public is, on the whole, more attracted by the æsthetic qualities of foods—such as appearance and flavour—than by nutritional values, and, of the qualities referred to, appearance exercises an unduly strong appeal. This is, perhaps, only natural, as the fact that a food looks appetising is a distinct aid to the digestive processes. The outcome of this appeal is that the naturally dull colour of some canned fruits has to be brightened by the addition of traces of food colouring matters which have been specially selected as being suitable for this purpose. Another feature connected with appearance is the grading of the product, and here the preference for graded over ungraded fruits—which is a strong selling factor in many cases—is probably mainly due to the education of the public, although an innate sense of tidiness may also have something to do with it. Any undesirable features such as cloudiness of syrup, broken or blemished fruits, and over or under processed products, are also points to be considered.

Flavour appears to be of less consequence to the consumer in this country than colour, but in this connection we are exceptionally fortunate, as the much-maligned climate of these islands is responsible for one very desirable characteristic—it gives us fruits and vegetables which, for flavour, cannot be surpassed by any other country in the world.

Individual preference of one fruit over another may vary greatly, but there are usually certain fruits—such as strawberries, raspberries, and Victoria plums in this country—which are generally popular, and others—such as gooseberries, black currants, and damsons—which do not sell so readily. The reasons for the relative unpopularity of the last three are worth investigating. People who regard the gooseberry as an uninteresting fruit when stewed are generally agreeably surprised and enthusiastic when they taste it after it has been canned in syrup. Black currants are, in the first place, much more open to individual disfavour, but few who have tasted the fruit canned will deny that it gives an exceptionally finely flavoured product. Both these fruits should, therefore, sell more freely when they become better known. Damsons prove an interesting example of a popularity which is geographical, as there appears to be a well-marked preference for this fruit in northern over southern parts of this country.

Although the fluctuation of likes and dislikes appears at first to be entirely capricious, it is quite possible to exercise a certain amount of guidance over these predilections, and, within limits, to direct the public taste in a desired direction. Attractive advertising is the best method of bringing this about, and it is a point on which the canning industry in this country can afford to concentrate greater attention if the British public is to know and ask for the products grown and canned in England.

An increase in the number of varieties of products on the market will to a certain extent affect the popularity of existing lines, and the fall in price of any particular class of canned food will tend to attract sales in that direction, but the only true and final criterion of popularity is *quality*—quality in the raw material, in the method of handling in the factory and in the labelling and packing. It is only if canners are prepared to pack quality inside and outside their cans that they can hope to compete against external competition and build up a sure market for British canned goods, not only in England, but also throughout the Empire and in foreign countries.

The points to consider at the moment are, therefore: What are the methods of measuring the degree of excellence of canned foods, and how can a high quality be obtained? To answer these questions it is simplest to describe the processes used in the accurate examination of canned fruits, and to outline briefly the facts relating to the nutritional qualities which it is desired to preserve in the finished article.

Cut-Out Examination.

The cut-out examination of canned fruits involves the visual assessment of the product for appearance, grading, etc., the determination of the weights of the solid and liquid portions, and, in the case of the larger fruits such as peaches, pears, apricots, and plums, the count of the number of units of fruit in each can. A fuller examination may include the measurement of the vacuum in the can, the density of the syrup, and the condition of the lacquer surface, etc.

The method employed at Campden, by which many hundreds of cans are examined each year, is as follows. The can is weighed, the vacuum is measured by means of a gauge fitted so as to puncture the top

of the can, the latter is then opened and the head-space estimated. As the first appearance on opening a can is of considerable importance, this point is carefully noted. The syrup is drained off, and the fruit spread evenly over a Monel-metal wire sieve of standard mesh. As far as possible the measurements are made at a temperature of 60° to 65° F., and the fruit is allowed to drain on the sieve for five minutes before weighing. During this time the fruit is inspected for colour, blemishes, grading, firmness, and preliminary preparation—*i.e.*, snibbing, plugging, strigging, etc. The weight of the liquid portion is obtained by difference. In the meantime the syrup is examined for colour, clarity, and flavour, and the density is determined. The latter measurement is made by floating a Brix. hydrometer in the syrup, which is contained in a glass cylinder, a correction for temperature being made if necessary. Finally, the can is inspected thoroughly, particular attention being given to the condition of the lacquer surface.

There are many points to be noted in connection with the examination outlined above, and it may be of value to set out some of these in greater detail.

Vacuum and Head Space.

These factors are of no great consequence as far as the immediate quality of the product is concerned, but in so far as they indicate the probability or otherwise of the can developing into a hydrogen swell in the near future the recording of these measurements is of value. No. 2 cans which show a head-space of $\frac{1}{8}$ inch should give a vacuum of 8 to 12 inches if they have been well exhausted.

Appearance.

There is only one fruit canned in this country—namely, strawberries—to which it is really essential to add a food colouring matter if an appetising product is to be obtained. These berries tend to turn a yellow or brown colour when canned, although certain varieties give a very much better natural tint than others. A bright, attractive colour in canned products is so popular that a trace of colouring matter is sometimes added to several other fruits, such as raspberries, loganberries, and red plums. Yellow plums such as the Pershore and Magnum Bonum will turn out a greenish-brown colour if canned when under-ripe, whereas if these varieties are canned when turning from green to yellow, the canned product will show an attractive yellow tint. Red plums must be canned at a stage when they are free from green patches, or the canned article will turn out to be uneven and unattractive in appearance.

In addition to the natural shades produced by the fruits themselves, there is the possibility of discoloration subsequent to the canning process. The natural colouring matters of the red and purple fruits are highly sensitive to the presence of tin, and so must be protected from direct contact with the surface of the tinplate. A scratched lacquer will soon cause these natural colours to alter and gradually to assume a bluish tinge.

Apart from the question of colour, the fruit has to be examined for signs of blemish and for the presence of misshapen, under-ripe, and over-ripe fruit. Blemishes may be due to disease, and for this reason certain types are more plentiful in one season than in another. In the season just past the wet weather encouraged certain diseases, which affected the fruit to such an extent that results were detectable in the canned products. Gooseberries were found with small, raised, brown, leathery spots, quite distinct from the common brown "rust" spot which sometimes occurs on these berries. Strawberries in some cases showed large, hard, brown areas, and the mycologist at the Long Ashton Research Station has shown that the defect is due to a fungus which also causes leaf spots and an infection of the flower stalks. The commoner blemishes include the presence of a jelly-like substance on the end of the stone of certain varieties of plums—notably the Czar, the Blaisdon Red, and the Victoria. The cause of this trouble does not appear to be known—it has been assumed to be due to the puncturing of the skin of the plum by an insect—but it is possibly of physiological origin. Raspberries and loganberries are liable to attack by the raspberry beetle, which not only leaves a dark mark on the surface of the berries, but deposits its eggs inside the fruit. The eggs hatch out and produce maggots, and if the berries infected in this manner are canned the maggots will float to the surface and spoil the appearance of the pack.

The preliminary preparation of the fruit is of great importance, as few things can be more unsightly in a can than dirty fruit, portions of leaf, calyx, and stalk, or berries which have not been hulled. Gooseberries which have been poorly snibbed often shrink badly after processing.

Grading.

The public has been educated to accept grading as a desirable quality in canned fruits, and most large distributing firms in this country insist on the importance of good grading. In the case of gooseberries, plums, and damsons, very little difficulty is encountered, and mechanical graders can be used successfully. Raspberries, loganberries, and strawberries cannot be dealt with so easily, and strawberries particularly are difficult to grade in a satisfactory manner. This is due to the soft texture of the fruit and the variation of shape as well as size. It is satisfactory to note that grading is rapidly improving in many of the canneries in this country.

Firmness.

The fruit should be cooked to such a degree that it is of correct texture for eating without further treatment, provided that the processing given is sufficient to ensure sterilisation. Over-ripe fruit will not stand such drastic heat treatment as firm, ripe fruit, this being particularly noticeable in the case of plums, this fruit being very liable to split if canned when too ripe. Raspberries, loganberries, and currants are not so sensitive in this respect if canned at the right stage. These fruits, if packed over-ripe, will tend to settle down in a solid mass in the can, and will thus be more difficult to render sterile.

Drained Weights.

The drained weight of the fruit does not give an exact measure of the original weight filled into the can. The fruit shrinks to a greater or less extent,

Examination of Canned Fruit showing Fruit Draining on Monel Metal Sieve and Testing Density of Syrup by Brix Hydrometer.

Measuring Vacuum in Cans.

and the water present in it passes out into the syrup until equilibrium is reached, with the result that the drained weight recorded is generally considerably less than the original weight. The former is also affected by the extent and nature of the heat treatment given.

It is only by the accumulation of a very great number of accurate figures on the drained weights of each class of fruit treated under controlled conditions that it is possible to estimate the original weights with any reasonable degree of accuracy.

Density of Syrup.

The measurement of the density of the final syrup when taken in conjunction with the original ratio of fruit to syrup packed gives a means of calculating the density of the original syrup used. This value may be obtained with a fairly small margin of error, but is dependent on the actual composition of the fruit, which varies with the degree of ripeness and with the climatic conditions under which the fruit has developed.

Other things being equal, the final density is a measure of the sweetness, and it is worth while to consider how this may vary with different ratios of fruit to syrup. In No. 2 cans about 11 to 12 ozs. of soft fruits are packed, and 12 to 13 ozs. of stone fruits. With syrup of a density of about 45° Brix. a variation of 1 oz. in the weight of fruit packed alters the final density by about 1½° to 2° Brix. This difference is sufficiently large to be detectable by a person with a reasonably good palate.

A variation of 1 oz. in the quantity of syrup used alters the final density by about 1° Brix. Five degrees difference in the strength of syrup used causes a variation of about two to two and a half degrees in the final density.

Condition of Can.

In the case of the red and purple fruits, penetration or removal of the lacquer surface of the can is generally associated with discoloration or bleaching of the product. This discoloration is frequently found where scratches have occurred in the lacquer, and these show up more noticeably when the metallic surface beneath has been corroded by the fruit acid. Excessive corrosion may cause the lacquer to peel, and in such cases the syrup is generally found to be cloudy and thick in appearance, and the colour is badly bleached.

Occasionally a slight dark feathering of the tinplate below the lacquer may be noticed, and this is usually associated with a peculiar flavour in the canned fruit. Such products have generally been contaminated with sulphur in the form of lime-sulphur sprays or green sulphur, with which the fruit had been treated before picking.

Health Aspects.

As canned fruits are rapidly assuming an important place in the nation's diet, it is essential that every effort should be made to ensure that the maximum nutritive value of these products is retained. Few such articles are in their nature so much luxury products that their food value may be neglected.

In canned fruits the only ingredients are the fruit itself and a syrup prepared from cane or beet sugar—both substances of a very high degree of purity. Any colouring matter added must conform to the existing food regulations, which means that it must be of a type which is known to be suitable for use in food and must be free from metallic contamination. As preservation is brought about by heat treatment and not by the use of artificial preservatives, there is no adulteration from this source. Canned fruit is *fresh* fruit which is *sterilised* by means of heat, and, as has been shown above, is initially a very pure product. The important point to consider is whether there is any falling off in quality consequent upon heat treatment or on subsequent storage of the cans. Such deterioration might be bacteriological or chemical in nature, and these two aspects must be considered separately.

The object of the heat treatment is to destroy yeasts and mould spores and to kill or inhibit completely the action of bacteria. The strong acidity of fruits and the free circulation of liquid in the cans renders this process very easy to carry out, and, provided the fruit is not packed in an over-ripe condition and allowed to mat solid in the cans, the heat treatment recommended for general use is much greater than that required to preserve the products in sound condition.

Another point to consider is the possibility of destruction of the nutritive value by the action of heat or by gradual deterioration on storage. As far as these points are concerned it has been shown that there is no detectable breakdown or alteration in the essential protein substances during processing, and, if care is taken to exclude the presence of air in the cans, the loss of vitamin C—the principal vitamin of fruits—is comparatively slight. Destruction of this vitamin is brought about by the action of air at high temperatures, and so tends to be greater in fruits stewed in a saucepan in presence of air than heated in a can which is hermetically sealed. If any air is left in the can the oxygen is quickly removed and eventually replaced by hydrogen. As enzymes and micro-organisms have been destroyed, no deterioration of the fruit can take place on storage.

The final aspect to consider is the possibility of metallic contamination. As the sealing of the cans is carried out mechanically, there is not the same possibility of contact with solder which used to occur in the old type of hole-and-cap cans. The only two metals which come into contact with the fruit are iron from the steel base of the tinplate and tin from the surface coating. The latter metal is extremely pure, and is not regarded as injurious to health unless present in considerable quantities. The limit generally recognised for this metal, beyond which it is inadvisable to consume the food, is 2 grains per pound, but in well-lacquered cans this metal is seldom present to the extent of more than minute trace. Even when stored for long periods under temperate conditions the amount of tin is frequently less than one-tenth of the recognised limit.

From the details given it is hoped that canners will realise that they have it in their power to pack a type of foodstuff which will not only prove attractive to the eye, but will also take an important place in the dietary of the nation.

The Preservation of Meats in Tin and Glass Containers

By A. SAMSON, A.R.C.S., A.I.C.

The second of a series of articles in which the author discusses in plain language the requirements, both scientific and practical, that are essential to the successful preservation of meats in tin and glass containers, emphasising those particular points which need careful control and observation, and which are apt to be overlooked—especially by those who do not possess a chemist or laboratory. The first part, published in the September issue, dealt with the correct use of the refrigerator, the equipment of the brine house, the ingredients of the brine, and the practice of brining.

PART II.—COOKING

AFTER THE brining process the meats are cooked. The brined meats are transferred to the "kitchen" by means of trucks, generally of wood, but preferably of metal, and it is essential to see that these are well and frequently washed, to remove any residue of contaminating brine.

Cooking Vessels.

Cooking is usually done in metal containers, and although wooden tanks are sometimes used, the former are to be preferred, because the wood is liable to be a source of bacterial contamination. The metal containers may be either tanks or steam-jacketed pans of large capacity.

In the case of tanks, steam may be introduced by means of open or closed coils. When introduced by open coils, it is essential to have a pure water supply in the boiler, free from gases or sulphur compounds.

It is a controversial matter which is the best metal to use; galvanised tanks have been used with success and freedom from zinc contamination, but the writer favours aluminium vessels; these must, however, be kept scrupulously clean and free from salt. Whenever cooking is finished, aluminium vessels should always be well rinsed out with clean water, for, if there is an accumulation of salt, they are liable to develop "pitting." It is an unfortunate matter that there is still no metal which can be considered very satisfactory from the meat packer's point of view. Some find aluminium very satisfactory, others say it does not last well, the difference being probably due to the treatment the vessels have received.

In whatever type of vessel the meat is cooked, it is essential to see that the meat is completely submerged during the process. It is quite remarkable how spoilage can occur in meat that is above the surface of the cooking water.

It is not advisable—for two reasons—to cook too many batches of brined meats in the same cooking water; the bacteriological contamination is gradually increased, in the case of resistant spores, and the salt content of the cooking water may be so increased as materially to affect the flavour of the meats.

Packing Tables.

At the end of the cooking period the meats are discharged on to the packing tables for draining. The care of these tables is very important; in practically all establishments they are wooden tables, the tops of which are made up of boards joined together, and in the "joints" of these boards there lurk serious bacteriological sources of contamination. Juices fall into these joints and remain there, where, in the course of time, they putrefy. One cannot over-emphasise the need for the strictest cleanliness with regard to these tables. They must be cleaned every day, and at the end of each day, especially during summer; the wash water should contain a small amount of disinfectant solution, such as sodium hypochlorite. All traces of the compound will have disappeared by the morning.

In the case of meats cooked for preservation, these packing tables are rarely made of metal. If hot meats are left in contact with metal for a fairly lengthy period, such as four or five hours, the meat may later develop metallic "spotting," due to an inter-action between the meat juices and the metal. These spots are generally sulphides, or sulphur compounds, and may be caused by using even such metals as Monel metal or nickel.

It is advisable to allow as much liquor as possible to drain away from the meats prior to packing into the glass or tin containers. This drainage not only removes a large quantity of water, but also a certain quantity of mineral salts as sulphates, which may be troublesome later in giving precipitates.

It is advisable to prevent as much as possible any action between the cooked meat and metals which are liable to give black coloured sulphides. Dark coloured jelly can often be traced to a minute impurity of metallic sulphide. Copper is particularly dangerous in this respect, but aluminium does not produce black sulphide, nor does zinc.

Containers.

The containers used for packing meat products are tin and glass. In this country a very large amount of glass is used for meat preservation.

(*a*) *Tin Containers.*—The tinplate should be of

good quality and well coated. It is essential to see that the tins are not allowed to develop rust during storage. This rust is very apt to be a source of considerable trouble. Especially is this the case when the edges of the containers become rusty. During processing, a chemical action takes place between the rust and the meat juices, and very often there is produced a peculiar grey precipitate of phosphate of iron in the jelly. This renders the jelly very unsightly and is apt to be a source of considerable annoyance.

Empty tin containers should always be stored in a dry place, upside down, in order to prevent access of dirt and, very often, of undesirable bacteria, and they should always be well washed out before being filled.

(*b*) *Glass containers*.—There is very little trouble experienced with glass containers, though, of course, care must be exercised when packing hot meats into them. There is one warning which should be given in connection with the common practice of washing them with some alkaline material, such as washing soda. Unfortunately, after this treatment the glasses are often not efficiently rinsed before being filled, and the result is that there is often a slight residue of alkali, which is liable to upset the chemical equilibrium during preserving. Glass containers must be well rinsed previous to packing, so that there is no trace of alkali left.

In packing the meats into the glass or tin containers, it is advisable that the meats should be as hot as possible. This assists the expulsion of the air during the process of "pressing," and also allows the gelatine stock, which is poured into the containers, to fill up all interstices.

Gelatine.

This material is very largely used in providing the binding medium between the several pieces of meat packed into the containers, and it probably causes more anxiety and loss than any other material used in the preservation of meats. The strictest control must be kept on the purchase in order to obtain the best possible gelatine. Each consignment should be subjected to chemical and bacteriological tests, but this, of course, is difficult in those concerns which do not possess a chemical staff.

Packers should buy their gelatine supplies from a house of repute, and should state definitely what the gelatine must, and must not, be.

Gelatine is prepared from two raw materials, hides or skins, and bones. Very often a gelatine manufacturer will tell you that the one class of material produces a better gelatine than the other. This may be true for certain purposes, but, as far as the meat packer is concerned, he need never believe this statement. The truth is that the value of the resultant gelatine, when produced either from skins or bones, depends on the method of manufacture and the care exercised during manufacture. Each gelatine, skin or bone, is as good as the other, providing the raw material has been treated with certain definite objects in view.

There is one point that should be mentioned with regard to "strength" of gelatines. Very often manufacturers say that they have compared their competitors' gelatines by making up 5 per cent. or 10 per cent. solutions in glasses at their offices and "next morning our jelly was stronger." These statements are really valueless; take no heed of them. Such a test is not a true test.

The strength of a jelly depends on many factors, especially in the case of a gelatine, which has to undergo excessive heating, as in preserved meats.

One of the important points to look for is the quantity of sulphur dioxide. Ask the manufacturer to keep this ingredient as low as possible, as sulphur dioxide assists the formation of sulphur staining.

Remember that when gelatine is prepared during the hot months of the year a fair proportion of sulphur dioxide is always present in order to prevent loss through bacterial agencies. There is less chance of such loss during winter preparation, hence less SO_2 is used. Consequently it is an advantage to buy winter-packed gelatine.

Furthermore, the chance of any bacteriological contamination is greater in summer-packed gelatine, and liquefying organisms and moulds are likely to occur in larger numbers.

Another important quality that a good gelatine ought to possess is a low ash content. As explained earlier in this article, white "foots" or precipitates in glass are due to lime deposits. The ash of gelatine contains a large proportion of lime, and it is therefore advisable to specify as low an ash as is possible, in order to minimise trouble from the lime in the ash. One should therefore specify a gelatine to have no more ash than 0·5 per cent. This is by no means a commerical impossibility.

Another important point is the acidity of the gelatine. It is a well-known fact that when gelatine with an acidic character is heated in solution, the jelly strength is rapidly destroyed. The acid is often derived from the oxidation of the sulphur dioxide to sulphuric acid. Equally important is it to note that the gelatine must not show an alkaline reaction, as this also tends to break down the jelly strength, and to interfere generally.

It is rather difficult to explain what reaction a gelatine should have without going into lengthy scientific details, as the true acidity of the gelatine involves a consideration of its hydrogen-ion concentration (pH value). Suffice to say that the best acid strength of a gelatine is when its pH value lies just on the acidic side of neutrality.

Additional points to note are that gelatine should be free from smell when soaked, and that it should be specified to contain as little copper and iron as possible, as both of these tend to produce darkening: copper is the more dangerous.

Preparation of Jelly Stock.

Having obtained the best possible gelatine, its value may often be lost by its method of preparation into jelly stock.

When soaking gelatine never use wooden vessels. Always wash the gelatine first, by covering with water, preferably running water, stirring up for about ten minutes, and then replacing with entirely fresh water. This removes the loosely adhering dust and bacteria. The gelatine is now allowed to soak

(*Continued on page* 339.)

Standardisation of Canned Fruits

By T. N. MORRIS, M.A., and J. M. BRYAN, B.Sc.
Low Temperature Research Station, Cambridge.

The authors demonstrate the necessity for careful control of the quantities of fruit and sugar used in canning, from the point of view of both flavour and economy. A few per cent. excess of sugar does not necessarily give a better pack, but may mean a considerable loss to the canner on a season's run.

THE DESIRABILITY of standardisation for canned fruits is generally admitted. It is essential that consumers should know exactly what they are buying; an unsatisfactory pack by one canner may create prejudice against English canned goods as a whole.

It is also necessary to have standards if co-operative advertising is to become possible.

American Standards.

These have been made fairly well known to canners through the agency of Chipping Campden and the National Food Canning Council.

There are five main grades for most fruits, based on the syrup strength and the quality of the fruit. The highest grade contains the most sugar; the lowest grade is packed in water.

The thick appearance of the syrup of such products as peaches and apricots is due to the presence of gums and pectin.

Considerations in Standardising.

(i.) The main consideration is the final flavour and appearance of the pack. The amount of sugar to be added will be mainly regulated by the acidity of the fruit. Other considerations such as the relative price of sugar and fruit may occasionally have some weight. Also it must be borne in mind that products of very high syrup strength are somewhat difficult to sterilise, especially in the larger cans.

(ii.) The final or "cut-out" syrup strength is the result of the mixing of the added syrup with the juice of the fruit.

It is therefore not sufficient merely to regulate the strength of the syrup added, but attention must be paid to the weight of fruit filled into the cans. Other factors such as the ripeness of the fruit and whether it is wet or dry may at times have to be taken into account. Wet fruit usually packs closer than dry fruit, and may cause over-filling to the extent of 1 ounce per 1-lb. can.

Regulation of Syrup Strength.

It is difficult to see how the syrup strength can be properly regulated without the use of a hydrometer or other suitable instrument.

Concentration of the syrup occurs during ordinary working, and is especially severe after stoppages or with syrup which has been left in the pans overnight.

Hydrometers of the standard American Baumé type made of glass can be obtained with a good open scale. They should be checked periodically to make sure that the scale has not slipped.

Metal hydrometers are liable to corrode and often introduce considerable errors owing to the fact that they have lost weight, or they may become perforated so that the liquid can enter the interior.

The final syrup strength in the can on standing can also be tested with a hydrometer or with a refractometer.

Table I. shows the readings on the Baumé scale corresponding to definite sugar percentages, both when the syrups are boiling and at ordinary temperature. It also gives the specific gravity and degrees Twaddell at ordinary temperature and the number of pounds of sugar per gallon.

Filling Weights of Fruit.

Analyses of a large number of cans have shown that a good working figure for soft fruits is 0·61 parts by weight of fruit per unit volume of filling space; for stone fruits the figure is slightly higher—viz., 0·65 parts per unit volume. In other words, a fluid ounce of filling space will contain 0·61 ounces of soft fruits and 0·65 ounces of stone fruit.

Hence the correct weight of fruit per can in ounces is found by determining the number of fluid ounces in any given size of can up to the filling line and multiplying this figure by 0·61 for soft fruit and 0·65 for stone fruit.

It is not suggested that the fruit should be weighed into the cans, but that the fillers should be instructed

in filling the different fruits so as to obtain approximately the correct weight per can.

Standardisation cannot be attained unless the filling is brought to a high degree of uniformity.

TABLE. I.—SYRUP TABLE

TABLE SHOWING APPROXIMATELY THE QUANTITY OF SUGAR AND WATER REQUIRED FOR SYRUPS OF DIFFERENT DENSITIES.

Sugar* (per cent.).	Baumé at 60° F.	Baumé Boiling.	Twaddell at 60° F.	Water per Gallon of Syrup (ozs.).	Specific Gravity at 60° F.	Weight per Gallon of Syrup (sugar lbs.).
12·5	7·1	4·2	10	147	1·050	1·31
13·5	7·7	4·8	11	145·25	1·055	1·44
15·0	8·3	5·4	12	144	1·060	1·59
16·0	8·9	5·98	13	143	1·065	1·79
17·0	9·4	6·48	14	142	1·070	1·81
18·0	10·0	7·07	15	141	1·075	1·94
19·5	10·5	7·66	16	139·5	1·080	2·[illegible]
20·5	11·2	8·26	17	138·25	1·085	2·20
21·5	11·8	8·85	18	137	1·090	2·31
22·5	12·6	9·75	19	135·5	1·095	2·47
24·0	13·2	10·25	20	134·25	1·100	2·60
25·0	13·8	10·84	21	132·5	1·105	2·75
26·0	14·4	11·44	22	131	1·110	2·90
27·0	14·9	11·94	23	130	1·115	3·04
28·0	15·4	12·43	24	128·75	1·120	3·17
29·0	16·0	13·03	25	127	1·125	3·31
30·0	16·5	13·45	26	125·5	1·130	3·43
31·0	17·1	14·05	27	124·25	1·135	3·69
32·0	17·6	14·55	28	123	1·140	3·71
33·0	18·2	15·14	29	121·5	1·145	3·86
34·0	18·6	15·54	30	120	1·150	3·95
35·0	19·2	16·14	31	119	1·155	4·06
36·0	19·8	16·74	32	118	1·160	4·20
37·0	20·3	17·10	33	117	1·165	4·34
38·0	20·8	17·65	34	115·5	1·170	4·48
39·0	21·4	18·25	35	114	1·175	4·62
40·0	21·9	18·75	36	112·5	1·180	4·76
41·0	22·4	19·25	37	111	1·185	4·90
42·0	23·0	19·84	38	110	1·190	5·06
43·0	23·5	20·33	39	108·75	1·195	5·15
44·0	24·0	20·82	40	107·75	1·200	5·25
45·0	24·6	21·41	41	106·75	1·205	5·37
46·0	25·1	21·90	42	105·5	1·210	5·5
47·0	25·5	22·29	43	104	1·215	5·6
48·0	26·1	22·88	44	103	1·220	5·78
49·0	26·6	23·37	45	101·75	1·225	5·89
49·5	27·2	23·96	46	100·75	1·230	6·0
50·5	27·6	24·40	47	99·5	1·235	6·125
51·5	28·1	24·80	48	98·25	1·240	6·25
52·5	28·8	25·50	49	97·25	1·245	6·37
53·0	29·0	25·70	50	96	1·250	6·5
54·0	29·3	25·9	51	94·75	1·255	6·75
55·0	29·8	26·3	52	93·5	1·260	6·89
56·0	30·3	26·8	53	92·25	1·265	7·06
57·0	30·7	27·2	54	91·00	1·270	7·17
57·5	31·2	27·7	55	89·5	1·275	7·33
58·5	31·8	28·2	56	88·0	1·280	7·49
59·0	32·2	28·6	57	86·0	1·285	7·64
60·0	32·5	28·9	58	84·25	1·290	7·8
61·0	32·8	29·2	59	81·5	1·295	7·92
62·0	33·3	29·7	60	80·5	1·300	8·17
62·5	33·8	30·2	61	78·0	1·305	8·33
63·5	34·3	30·64	62	76·5	1·310	8·49
64·0	34·5	30·83	63	75·0	1·315	8·59
65·0	34·9	31·00	64	73·5	1·320	8·75
66·0	35·3	31·3	65	72	1·325	8·89
67·0	35·9	31·8	66	70·5	1·330	9·06
67·5	36·3	32·1	67	69	1·335	9·17
68·5	36·7	32·4	68	67·75	1·340	9·30
69·0	36·9	32·5	69	66·25	1·345	9·48

* The figures in this column may also be taken to represent degrees Brix.

TABLE II.—TYPICAL VALUES FOR x OBTAINED FOR VARIOUS FRUITS

Loganberries ...	10·6	Red Cherries ...	10·0
Raspberries ...	8·1	White Cherries ...	10·0
Blackberries ...	13·0	Victoria Plums ...	10·0
Strawberries ...	6·5	Greengages ...	12·1
Red Currants ...	14·0	Damsons ...	11·6
Black Currants ...	15·0	Golden Plums ...	9·4
Morello Cherries	12·6		

The Filling Line.

It is necessary to have a head-space in the can, and there should be some general agreement on the question as to how large this should be.

Some authorities consider that cans should be filled to within three-eighths of an inch from the top, but it is probable with the modern hot syruping and comparatively efficient exhaust methods that five-sixteenths to a quarter of an inch is sufficient.

To Calculate the Syrup Strength.

This can be done from the formula

$$W_1 + W_2 = W_3 \quad . \quad . \quad . \quad (1)$$

and

$$W_1x + W_2y = W_3z \quad . \quad . \quad . \quad (2)$$

where

W_1 = weight of fruit in the can;
x = a factor representing the effect of the fruit solids (see below).
W_2 = weight of added syrup.
y = percentage of sugar in the added syrup.
W_3 = total weight of fruit and syrup.
z = percentage of soluble solids in the final product.

The same formula also applies in a more general way and can be used on small samples if—

W_1 = weight of fruit in a unit volume of the final product.
x = as before.
W_2 = weight of added syrup in a unit volume of the final product.
y = percentage of sugar in the added syrup.
W_3 = weight of a unit volume of the final product (specific gravity).
z = percentage of soluble solids in the final product.

If x is taken as the percentage of total solids in the raw fruit juice there will be an error due to the insoluble solids and the substances rendered soluble by heating. This error may amount to 3 or 4 per cent.

If an average figure for x is obtained by actual canning experiments, in which it is the only unknown quantity, a rough forecast of the strength of the added syrup, required to produce any desired final product, may be made, and slight adjustments applied after a trial.

Some average figures for x found as the result of a very large number of tests, are given in Table II. for the principal fruits, but it must be borne in mind that departures from this average are often considerable (see *below*).

Experiments on raspberries at this station may

have some interest from the point of view of standardisation.

They were conducted to determine the following points:

(*a*) The effect of varying the quantity of fruit in the can with the syrup strength and filling line constant.

(*b*) The effect of varying the syrup strength with the weight of fruit and filling line constant.

(*c*) The effect of wet and dry fruit on the filling.

One pound tall cans were used in all the experiments and a quarter of an inch head-space was given. The raspberries used were Hornets and Baumforth seedlings containing 11 per cent. of total soluble solids in the raw juice. The cans were stored ten days and turned each day before being tested, so that the contents should be practically homogeneous. The results under the different headings are as follows:

(i.) One ounce variation in the fruit caused a difference of 4 per cent. in the final syrup strength when a 55 per cent. syrup was added. The 0·61 ratio of fruit to final product previously mentioned was most satisfactory as regards appearance and flavour.

(ii.) A variation of 10 per cent. in the strength of syrup added caused 5·6 per cent. difference in the final syrup strength. A final product of low sugar content was less bright in appearance than those with more sugar. For raspberries it was considered that 32 to 33 per cent. of soluble solids reckoned as sugar in the final syrup was most satisfactory as regards flavour when the fruit was present in the 0·61 ratio.

(iii.) Wet fruit packs closer than dry fruit, consequently it is easy to overfill slightly when the fruit is in the former condition. This caused the syrup strength of the final product to be about 2 per cent. lower than in the case of dry filling to the same mark. When equal weights of wet and dry fruit were used the final difference was only 0·4 per cent.

A difference of 2 per cent. in the syrup strength was found to be appreciable to the palate with this product.

In the case of the raspberries used in these experiments the average figure for x was 13·7. This is greatly in excess of the average figure given in the table, owing largely to the dry season (1929). Less sugar was therefore necessary to reach the standard than in an average year.

A Gastronomical Diary

LISTENING to Mr. Vernon Bartlett broadcasting on the subject of the "Way of the World" the other night we noticed that he recommended the popularisation of holiday travel in England instead of abroad, and thought that a gastronomical diary such as *La Carte Gastronomique de la France* might be compiled. Mr. E. V. Lucas had already suggested "a greedy map" for England, and it is surprising to note how many epicurean delicacies are associated with towns or counties in England. Who has not longed for Devonshire cream and Kent strawberries? Many a hungry hiker has consumed Melton Mowbray pies or Bath chaps and rounded off a pleasant repast with Cheshire, Cheddar, or Stilton cheese washed down with Burton ale or Hereford cider. The gastronome—now that the "R" has reappeared in the month, when one does not need to dine in daylight—thinks first of Whitstables or Colchesters—regardless of the fact that on the morrow Epsom salts or Malvern waters may be required. Afterwards a Dover sole with Worcester sauce, a Surrey capon or an Aylesbury duckling, with Cambridge sausage and Jersey potatoes, finished off with Escrick cheese and Worcester pippins, all serve to feed and satisfy. To the more humble, a Yarmouth bloater or a Loch Fyne kipper, a slice of York ham or a Cornish pasty provide adequate sustenance. For tea we have Reading biscuits, Eccles cakes, Banbury buns, Bath buns, Brighton biscuits, and Osborne biscuits. As beverages we can choose from London or Plymouth gin, drink London stout, Kent's Best, Burton ale or Devonshire cider. The sweet tooth can be regaled with Bournville chocolate, Doncaster butterscotch, Edinburgh toffee, Mitcham mints, or Windermere toffee.

We have left the best to the last, as the small boy said, taking the last cake from the plate. There is still the roast beef of All England with Yorkshire pudding. Not original enough, eh? Then try a good, old Lancashire Hot Pot made as only the Lancashire folks can make it.

Bêche-de-mer

THERE are several species of the large sea slug, Holothuria, commercially known by the names beche-de-mer, or trepang, states Q. F. Roberts at Suva, Fiji Islands, in a report forwarded to the U.S. Department of Commerce. Fishing is done almost entirely by native Fijians. The process of curing is simple. The slugs are first boiled for about twenty minutes, split open, and gutted preparatory to being dried. The usual method of drying is to place the clean slugs on reed frames over a brick fire.

The most sought after and highly priced species is the "teat" beche-de-mer, so called from the rows of ambulacral feet on the under surface of the body. The "teat" beche-de-mer is chiefly found on the reefs that lie off the Yasawa Islands and the main fringing reefs north of the islands of Vitilevu and Vanualevu. Well-cured supplies of this variety of beche-de-mer are worth about £110 per ton.

There is a large demand for beche-de-mer in China and Japan, where it is considered a food luxury. Practically the whole supply in Fiji available for export is shipped to Hong Kong, the exports to that port in 1930 amounting to 298,592 pounds, valued at £13,500.

An Alaskan Cannery.

Developments in Fish Canning Equipment

By NELSON TROYER

A brief survey by a well-known American authority of the recent developments which have taken place in plant and machinery used on the Pacific Coast in connection with salmon cannery.

SALMON HAS been canned on the Pacific Coast for a great many years. The older methods were necessarily crude compared with present-day practice. Up to a few years ago, perhaps as late as 1910, the general practice among canners was to hand-clean all fish. Now, except in the case of very large fish like the Alaska king salmon and the Columbia River Chinook salmon, it is all done by machines.

A modern fish cleaning machine will accommodate itself to the smallest salmon, running from 22 or more to the case, up to the largest "chums," running 6 to the case, and clean them at the rate of 60 fish per minute. There is some hand work to be done after the machine delivers the fish, but this is very slight considering the great number of fish handled by the machine.

Hand-filling of cans, especially on 1-lb. tall cans, was largely done away with some years before the introduction of fish cleaning machines. The highest grades of fish are still packed in the cans by hand, usually in 1-lb. flat or ½-lb. flat sizes.

While machines have been built for filling the 1-lb. and ½-lb. flat cans, they are not in general use on the Pacific Coast. A great many of them are used in Japan and a smaller percentage in the Russian canneries of the Kamchatka district.

The latest can filler of the rotary type has been developed since the season of 1927. It will salt and fill 1-lb. tall cans at the rate of 115 to 130 per minute; whereas the filling machines up to that time could only turn out from 75 to 80 cans per minute.

The fish are generally cut with a gang knife to proper length for the can. One operator attends this machine. The cut pieces are arranged on a feeding chain belt into the filler by three operators. One attendant looks after the machine and keeps salt in the salter hopper.

From three to four operators are used on a "patching" table, over which all cans pass for inspection and touching up if they are slack filled or lacking in general excellence of appearance.

Machines have been built for filling cans, which are combined with a cutting arrangement so that the whole fish is fed into it. So far, this arrangement is still in its experimental stage. The tendency, however, is for such a machine, and we feel that another season will show automatically controlled machines that will take the whole fish and deliver filled cans without any manual attention.

Without doubt the most outstanding development in the salmon cannery has been the vacuum closing machine. The use of this type of closing machine has been so rapidly developed since 1926 that to-day it is almost universal. Its advantages are many and there are no drawbacks. It displaces the cumbersome exhaust box, some forty feet long and ten feet wide, and its attendant cloud of steam in the cannery. It is capable of handling up to 130 cans per minute and requires almost no attention. The use of a "clincher" to apply the cover to the can and clinch it to the can body flange loosely is necessary, but very few canneries operate exhaust boxes without covers clinched on the cans.

Small details like can washers are used in the line to keep the cans clean. Automatic cooler loaders are sometimes used. These machines place the cans in the "cooler trays," which are stacked on a car and rolled into the processing retort on a track.

Vacuum Sealing in an American Factory.

Some of our more modern canneries have installed an overhead conveyor chain with depending hooks about every ten feet. This chain brings empty cooler trays from the warehouse where the cans were taken out of them, up to the point in the cannery where the cans are put into them, subsequent to the cooking operation. This conserves time and space that formerly were necessary when hand-trucks were used.

In connection with the processing, retorts with doors at each end are very efficient. The loading of one or more retorts in a large cannery is practically a continuous operation, and the use of a double-end retort enables the unloading attendants to proceed with their work without interfering or being interfered with by the loading operations.

Warehouse methods have not changed much in recent years. "Labelling" machines are quite universally used, as also are "casing" machines.

Fish Transport and Handling.

The foregoing has dealt only with the cannery proper. An interesting part of the business might be mentioned here—namely, fish transportation and handling.

Two methods in most general use to carry the fish from the traps to the cannery are boats with fish-holds and scows. The cannery boats have the major portion of their carrying capacity in one large hold. This is generally divided off by removable partitions to prevent shifting of cargo in heavy weather. A bucket elevator is permanently installed from the bottom of the hold to a point high enough above the deck for the fish to be discharged over the side into the boot of a long elevator leading up into the fish storage rooms of the cannery.

The scow or barge method is to have an open-top bin covering practically the whole deck of the scow. The fish are brailed from the trap directly into this bin, as they are into the fish-hold of the cannery tenders. The deck of the scow or bottom of the bin must be above the water-line. On arrival at the cannery the scow is moored alongside of the cannery elevator. The elevator boot is under water, and the fish are sluiced with a hose through a gate in the side of the bin directly into the elevator boot.

At the top of the cannery elevator the fish are delivered on to a flat belt conveyor. This belt passes over the tops of various bins. Graders along this belt switch off the different species or grades of fish into their respective bins. These fish bins are built with a sloping bottom, high enough off the floor to allow fish to slide out of a gate opening on to a conveyor or table subsequent to the cleaning operations.

The shipment and handling of cans has undergone a considerable change in the last ten years. The freight rate for cans in a made-up form, from the point of manufacture to isolated Alaskan canneries, is quite high, and space on ships is not always available when cans are needed badly. To overcome this expense and inconvenience, can bodies are shipped in a flattened condition and formed, flanged, and one end put on at the cannery by machines furnished by the can manufacturer. A very con-

Electrically Operated Seaming Line in an American Cannery.

(*Continued on page* 339.)

Fish Research in U.S.A.

An account of work in progress at The National Canners' Association, North-West Branch.

THE NATIONAL Canners' Association is primarily interested in canned foods sterilised by heat, and confines its activities almost entirely to these products. The North-west Branch, located at Seattle, Washington, specialises in problems connected with the canned salmon industry, with some attention to other canned sea foods packed in the north-west, such as crabs, clams, and oysters. Being situated in the heart of a large vegetable, fruit, and chicken canning territory, problems relating to these industries are presented from time to time.

The North-west Branch has made an extensive study of the various factors which are involved in producing a quality pack, and, by a firm insistence on the importance of care and speed in the handling of the very perishable raw material, has had a considerable share in the marked improvement in canned salmon during the past ten years. By developing a thorough and logical method of examination for canned salmon which points out and fixes the responsibility for each defect, a quiet but powerful influence has been exerted toward the elimination of many inferior or even harmful practices of long standing in the industry. This method, either complete or variously modified, has been adopted by most of those charged with the examination and appraisal of this product.

There are five distinct species of Pacific salmons, differing greatly in size and life-history, and in the colour and texture of the flesh as well as the amount of fat, or oil, present. Each of the five species may also vary from very good quality down to very poor quality, according to whether the fish were caught early or late in the spawning migration and to the degree of care exercised in their preparation. Cans from the same parcel frequently vary greatly in quality, and it is felt that this lack of uniformity is an important and adverse factor in the merchandising of the product. Increasing emphasis will therefore be placed upon ways and means of increasing the uniformity of quality marketed under a given label. Some system of grading the salmon as they come from the cleaners should be devised, and work along this line will be carried on during the next packing season. Owing to the fact that the colour in the raw salmon flesh changes greatly during cooking, and to the fact that the amount of fat in the raw flesh can be estimated with only a fair degree of accuracy, grading before canning presents difficulties. However, the importance of uniformity to a certain standard of quality warrants a careful study of the feasibility of grading.

The enactment into law of the McNary-Mapes Bill, an amendment to the U.S. Food and Drugs Act of 1906, requiring the labelling of all canned goods falling below a certain standard (to be determined for each class of canned food) as sub-standard, has brought this matter to a head and necessitated some system of grading. The salmon industry supported this Bill whole-heartedly, believing it to be just to the consumer and an aid to the industry. The North-west Branch spent considerable time preparing a statement defining sub-standard salmon, and is now working on a numerical scoring system that will enable those having some knowledge of the product to assign a numerical value for each parcel. From a measurement of the free oil found in several thousand cans, certain rather definite standards have been arrived at for this factor of quality. These measurements include the five species of salmon from all districts during a period of five or six years, and are believed to be fair and representative.

A similar study of the colour of the flesh must now be made if, and when, a suitable numerical system can be devised for expressing the colour of salmon flesh. Two or three methods are now being tried out. As a possible means of preserving the colour in raw flesh during canning, and for preparing a cleaner product, the brining of the raw salmon will be studied. And closely related to this is the problem of achieving a greater uniformity of salting in the canned product. Some of the salters now in use depend on gravity, and slightly damp salt sometimes adheres to the salting device, lowering the salt in the canned product and resulting in a very inferior flavour. This matter will also be studied.

In the preparation of salmon for canning, about 25 per cent. of the fish used to be thrown away as waste. Much of this material, such as salmon cheeks, eggs, and milt, is fit for food. Considerable work has been done by the laboratory on the utilisation of this material for cat and dog food. The canned product has been prepared both with and without the admixture of cereals and vegetables. Cats, dogs, and foxes show a decided liking for these canned salmon products, which should prove to be a healthful addition to their diet.

Some work on the canning of crab has been done, and more may be attempted. Both the Dungeness crab (*Cancer magister*) and the king crab (*Paralithodes camtschatica*) are found in Alaska in considerable numbers, and their utilisation should prove profitable.

The Japanese oyster (*Ostrea cucullata*) transported to this coast thrives so well that a vast over-production is threatened. Attempts are being made to find a practicable and profitable method of increasing the merchandising area by canning. Several different types of products, such as whole oysters for frying, oyster stew, and oyster chowder, have been tried, and all of them seem very promising.

Several years ago fifteen or more methods of preparing canned salmon for market other than the traditional method were tried out. At that time the industry showed little interest, and research along that line was abandoned. If sufficient interest is aroused by the quality and uniformity campaign, further work along this line may be attempted. In brief, a large part of our work in the future, as during the past ten years, will be directed toward the production of a better and more easily merchandised canned salmon.

The "Iron Chink" in a Canadian Salmon Cannery.

(Courtesy of the High Commissioner for Canada.)

Boxing and Packing Frozen Fish at Prince Rupert, B.C.

(Courtesy of the High Commissioner for Canada.)

French Work on Tinplate Corrosion

AN INVESTIGATION has been made by Pellerin and Lasausse into the question of the corrosion of tinplate food containers (*Chimie et Industrie*, 1931, p. 204). Acetic and citric acids were used alone, in the presence and absence of air, and in the presence of common salt and phosphates. To approach practical conditions as far as possible, the tests were made in tinplate containers heated in an autoclave at 112° to 115° C. for an appropriate period. The influence of lacquers and double tinning on corrosion have also received attention. In view of the importance of this subject to food manufacturers, some of the experimental work, and the conclusions therefrom, are given below.

Tins holding about 150 c.c. were filled with a 0·75 per cent. solution of citric acid, while others were two-thirds filled, thus leaving an air-pocket. These were sterilised and the liquors examined for metals as below:

	Full Tins.			
	After Heating.	*1 Month.*	*2 Months.*	*2 Years.*
Acidity, gm. per litre...	7·22	7·17	7·14	6·96
Soluble tin, mg. per litre	traces	traces	traces	59·0
Insoluble tin	—	—	—	—
Appearance of metal ...	all perfectly clear and bright			

	Two-thirds Filled Tins.			
	After Heating.	*1 Month.*	*2 Months.*	*2 Years.*
Acidity, gm. per litre...	6·88	6·85	5·81	5·81
Soluble tin, mg. per litre	present	present	present	555
Insoluble tin	nil	present	present	present
Appearance of metal ...	very much attacked			

No tins were "blown," even after two years. The total tin and iron present in the liquids after two years was:

	Full Tins.	*Two-thirds Full.*
Tin, mg. per litre	59	555
Iron, mg. per litre	12	49

This clearly indicates that oxygen favours attack by citric acid, especially at the liquid level.

The next tests were made with both lacquered and unlacquered tins of 250 c.c. capacity, using the following solutions:

(*a*) A cold solution of citric acid containing 1·5 gm. per litre.

(*b*) The same solution as in (*a*) but boiled under reflex for fifteen minutes.

(*c*) A cold solution of 1·5 gm. citric acid and 20 gm. salt per litre.

(*d*) The same solution as in (*c*) but boiled under reflux for fifteen minutes.

Immediately after sterilisation, the tin surfaces of the containers filled with the boiling solutions were perfectly bright, while those of the tins filled with cold solutions were evenly mottled.* Only traces of tin could be found in the solutions from the former, and the cold salt-citric acid solution, but a quantity was detected in the liquid from the tins filled with cold citric acid alone. A 2 per cent. salt solution appears to stop solution of tin. In all cases iron was found. After standing for ten months, the contents of the tins were examined for metals with the following results:

	Tinned Containers.		*Lacquered Containers.*	
	Sn.	*Fe.*	*Sn.*	*Fe.*
Solution (*a*), mg. per litre ...	117	32	380	200
Solution (*b*), ,, ,, ...	26	20	138	105
Solution (*c*), ,, ,, ...	34	132	95	168
Solution (*d*), ,, ,, ...	14	100	102	200

It is concluded that oxygen favours the attack of tinplate by citric acid, and that salt retards solution of tin, but activates solution of iron. The lacquer is inclined to induce solution of the iron and tin.

Comparative tests were made with 0·15 per cent. citric acid solution and 1·25 per cent. acetic acid, the results being as follows (in mg. metal per litre):

	0·15 *Per Cent. Citric Acid.*		0·125 *Per Cent. Acetic Acid.*	
	Sn.	*Fe.*	*Sn.*	*Fe.*
Tins filled cold	336	30	trace	ferric abundant hydrate
	320	30	trace	
Tins filled hot	traces	32	14	60
	traces	32	14	26

The action of these two acids is rather different, one attacking tin and the other iron, but in both cases the action on the metal is accentuated by the presence of oxygen. It is also shown that citric acid and acetic acid solutions containing sodium chloride and magnesium sulphate attack tinplate only slightly in the absence of air, the sodium chloride again minimising solution of tin, but favouring that of iron.

The effect of the *p*H of citric acid and acetic acid solutions on the corrosion of tinplate was studied by adding disodium phosphate to the acid solutions to give a *p*H range of 5 to 7·7. After sterilisation the acetic solutions of *p*H 6·7 to 7·7 were free from iron and tin and the metal was bright. At *p*H 5·0 the liquid was slightly cloudy and contained traces of iron, while the metal was rusty in places in the unfilled area. Acetic acid alone produced corrosion, with solution of much iron. The tins with citric acid alone were attacked, the solution containing tin and iron. The quantity of tin present increased as the *p*H rose from 5 to 7·7 and the iron from *p*H 7·0 to 5·0. No iron was found in the liquid of *p*H 7·7.

The effect of acid solutions on the "blowing" of tinplate containers was determined by filling 400 c.c. tins with the solution, in some cases a small air-pocket being left. After sterilisation the tins were kept at 38° C. to accelerate any effect.

(*a*) *Acetic acid, 15 gm. per litre.* All containers were blown in five months in the presence of either salt or air; from some tins 42 to 112 c.c. of gas were obtained containing 1·65 to 1·85 per cent. CO_2 and 73 to 88 per cent. H_2. The metal surface was bright and the solutions contained iron but no tin. Some-

* It should be noted that the difference between the effects of the boiled and unboiled solutions is due to elimination of oxygen from the former

what similar observations were made with a solution of acetic acid, 10 gm. per litre, and one of 1·5 gm. per litre.

(*b*) *Citric acid, 15 gm. per litre.* In five and a half months half the tins had "blown," whether or not either salt or air was present, and all solutions contained much tin but traces only of iron. With a solution of 1·5 gm. per litre no tins had "blown" after five and a half months. One tin only was "blown" after five and a half months which contained a solution of 14 gm. of acetic acid and 1 gm. of citric acid per litre; the remainder were intact. Two of the latter contained 33 c.c. and 27 c.c. of gas, analysing 1·55 per cent. and 2·8 per cent. CO_2 and 41 per cent. and 45 per cent. H_2.

Acetic acid, even at weak concentrations, readily attacks iron, producing enough hydrogen to cause "blowing." Citric acid, on the other hand, dissolves tin, but in low concentrations does not cause "blowing."

On hydrolysis of fats, fatty acids are formed which can attack tinplate to produce "flocking," sometimes observed in old stock. The authors have proved that stearic acid, in the presence of water, will rapidly attack tinplate to give an insoluble tin compound.

Fatty Corrosion.—Pâtés de foie gras was tinned up and examined after ten and twenty months. The results are shown below (metal in mg. per kilo):

	Single Tinning	*Double Tinning.*	*Lacquered.*
After ten months:			
Tin	137	110	100
Iron	54	55	65
After twenty months:			
Tin	344	407	105
Iron	68	85	152

It is interesting to note that in the cases of the tinned containers the solution of tin increases with time, while with the lacquered tins solution of iron only continues. The lacquer film has probably limited the attack on tin to the small surfaces exposed by the cracking of the lacquer during the making of the tins.

A pork meat paste was tested under similar conditions, the results being (after twenty months):

	Simple Tinning.	*Double Tinning.*	*Lacquered.*
Tin	484	221	57
Iron	142	70	270

These results confirm the above suggestion.

Pickled fish was next tested, and the tins examined after twelve months storage:

	Simple Tinning.	*Lacquered.*
Tin	1,054	170
Iron	54	34

This was taken as a type of acetic acid corrosion. The bright tinned interior had entirely disappeared, the surface being uniformly greyish-blue. No rust spots were found. Could this corrosion be due to amine salts?

An example of organic-citric acid corrosion is shown by experiments on preserved mushrooms, which after twenty months storage gave:

	Simple Tinning.	*Double Tinning.*	*Lacquered.*
Tin	164	240	155
Iron	5	6	10

These results are in accord with those for citric acid alone.

A tinned tomato preparation after two years storage gave:

	Simple Tinning.	*Double Tinning.*
Tin	240	256
Iron	25	64

Finally, as an example of a neutral product, green peas were examined after eighteen months storage:

	Simple Tinning.	*Double Tinning.*	*Lacquered.*
Tin	72	38	23
Iron	71	33	48

Some American workers have remarked that tertiary amines aid the solution of tin, and it has now been found that the addition of sodium phosphate will clearly retard corrosion. This is considered due to the formation of a thin film of insoluble phosphate over the metal surface.

Survey of Wheat Situation

PESSIMISM continued to dominate the principal wheat markets during most of April-July. Wheat prices on the international market and in exporting countries fell to new low levels by the end of July, though in important Continental European importing countries prices were maintained by high tariffs and milling regulations. Export and international prices declined in the face of crop developments that now suggest a world wheat crop of 1931 substantially smaller than that of 1930, of an active European demand for wheat in most of the period, and of the maintenance of a large ex-European demand.

The crop year 1931-1932 has opened with aggregate stocks of old-crop wheat of record size in the four overseas exporting countries, but rather low in important European importing countries. Recent crop reports suggest a strikingly short crop in Canada, the second largest of post-war years in the United States, and perhaps in Russia, and an aggregate outturn of moderate size in the chief European importing countries. The present outlook for the Argentine and Australian crops is, of course, obscure; but it appears probable that these countries will not harvest notably large crops from their reduced wheat areas. With such a supply position, total net exports of wheat and flour in 1931-1932 may fall within a range of 710 to 800 million bushels; and if stocks are firmly held in exporting countries—a development that now seems more probable than improbable—international wheat prices may tend to rise from the low level of July-August, 1931. Presumably a rise could not go far in the presence of the heavy stocks in North America; and at the moment distinct firmness in prices seems more likely to become evident in the second than in the first third of the present crop year. (Report from the Food Research Institute, Stanford University, California.)

The Use of Nitrite in Curing

By J. W. BLACK, B.Sc., F.I.C.

The legal position in this country with regard to the use of sodium nitrite in the brine curing of meat is deplorably vague and unsatisfactory. The author of the following comments explains why this is so and, emphasising the necessity for clearing up the present situation, makes a suggestion concerning which we invite an expression of views from readers.

IN YOUR issue of August last you stated in answer to an enquiry that the use of nitrite in brine was prohibited in this country. The reason given was that nitrite is a preservative and is not included among those permitted by the Regulations of 1925.

This view has found expression in your columns in the past. One contributor, writing of nitrite in FOOD MANUFACTURE, August, 1930, states that "its direct use contravenes our present regulations concerning the use of preservatives in food." This position did not go unquestioned at the time, and in your issue of September last the use of nitrite in curing is mentioned by two contributors without any qualification. There is a clear anomaly here, and one which, to the writer's knowledge, has caused uncertainty among some preservers who are anxious to comply strictly with the food laws.

It is time that this uncertainty was removed, and, while these remarks are not intended as a contribution to the saltpetre *v.* nitrite question, the following considerations are relevant to the matter.

It is undisputed that the colouring effect of saltpetre depends on its conversion into the corresponding nitrite, and that the latter must be found in the cured meat to a larger or smaller extent.

It is the fact that there are curing or brining operations in which direct use of nitrite can be made with complete success, and with the added advantage of greater ease of control.

It is also true that the residual nitrite resulting from the use of saltpetre may be, and probably usually tends to be, greater than that derived from nitrite used directly.

Many of those who have experimented with nitrite would also claim, that by using nitrite, improvements could be made in the process of brining directly conducing to public advantage and scientific advancement.

If these points are conceded it would appear to be an obscurantist view to prohibit in an industrial process the direct use of a substance which in any case will be present in the final product, though it might be quite reasonable to limit the quantity of that substance which may be present.

I suggest the following as a defensible proposition which I put forward with the idea of clarity: "The addition of nitrite to foodstuffs as a preservative in quantities sufficient for this object is contrary to the purpose and intention of the Preservatives Regulations of 1925. These Regulations, however, were not intended to operate in restraint of reasonable modifications of approved existing processes, such as the substitution of nitrite for saltpetre in the curing of meats."

Dairy Bacteriology

LIKE other branches of the food industry, the technical control of dairying practice is largely a matter of applied bacteriology. Indeed, one does not see how it is possible to conduct dairying operations intelligently and successfully without at least a working knowledge of this science. It is, therefore, with much satisfaction that we note the appearance of the second edition of what is undoubtedly the standard work on the subject—namely, Dr. Orla-Jensen's *Dairy Bacteriology*, translated from the Danish by P. S. Arup, M.Sc., F.I.C. The fact that these two eminent authorities are associated with this book is in itself a guarantee of the high standard and reliability of the work. Dr. Orla-Jensen, it will be remembered, is professor of technical biochemistry at the Royal Technical College, Copenhagen, and formerly director of the Swiss Experimental Dairy Station, while Mr. Arup is well known as chief analyst at the Butter Testing Station, Department of Agriculture, Irish Free State.

Most of those engaged in dairying practice are acquainted with the first edition of this work, so that it is unnecessary to detail its contents. In general terms, the ground covered embraces milk, cream, buttermilk, separated milk, whey, butter, and cheese, also pasteurised, condensed, and dried milk.

Let it be said that this is more than a mere laboratory handbook; it is primarily a guide to the most up-to-date and the best practice in dairying operations. It is, we have no hesitation in saying, really indispensable to practical man and scientific worker alike.

In the second edition the matter has been expanded to include such data as have accumulated since the appearance of the first edition ten years ago, involving an increase in size to the extent of twenty-five pages. The matter is well arranged, the illustrations are excellent, and so are the paper and general lay-out and appearance of the book. We congratulate the authors and the publisher. (*"Dairy Bacteriology," by Dr. Orla-Jensen, translated by P. S. Arup. Pp. 208. Illustrations, 67. Price, 18s. 1931. J. and A. Churchill, London.*)

Vitamins

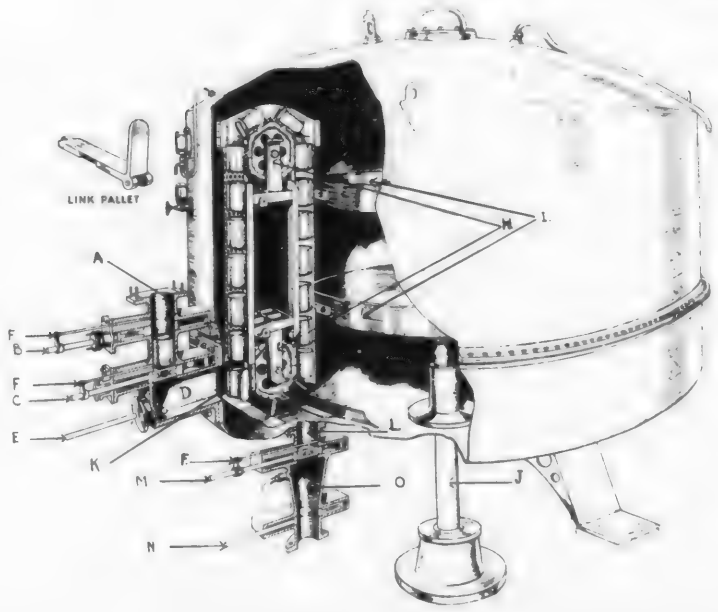
FEW people have any conception of the enormous output of scientific research; it is a rapidly rising flood utterly beyond the power of any human being to cope with. Take one relatively tiny part of this—the research on vitamins. This is merely one of the many departments of biochemistry, and biochemistry is only one of the many branches of science as a whole. Yet such is the immense output of research on vitamins that a survey of these researches has required a book the size of a telephone directory.

Before us we have a copy of this monumental work. It forms the first of a new series of monographs of the Pickett-Thomson Research Laboratory, whose *Annals* have so far dealt only with bacteriology. This amazing work has been written by Dr. Ethel Browning, Assistant Pathologist to the Laboratory, and we are filled with admiration at the results of the immense task she has carried out of reducing to order and system the tangle of information which has accumulated during the last twenty or thirty years. This contribution to knowledge is truly a magnificent achievement.

It is, of course, impossible to give more than a general idea of the ground covered by this work. It opens with a discussion of vitamins in general, reviewing the history of their discovery, their origin, action, nature, stability, estimation, and their relation to health. The various vitamins are then dealt with in turn. Part II. embraces the fat-soluble vitamins, A, D, and E, and Part III. the water-soluble vitamins B and C. For each the subject-matter is clearly and systematically arranged under such headings as occurrence, chemical nature, stability, deficiency phenomena, distribution in various foodstuffs, and so on. In addition, there is an extensive table showing the vitamin content of foodstuffs (fresh, preserved, and otherwise treated), followed by an extremely interesting and useful summary and conclusions arrived at by the author, and, finally, a list of about 3,000 references to literature. Thus, assuming that each paper represents on the average one year of investigation, then this volume gives the epitomised knowlege from 3,000 years of research!

Those engaged on the technical side of food production and examination will find Miss Browning's work of very great assistance. Hitherto it has been troublesome to search for particular information among the widely-scattered papers, often difficult of access—apart from the fact that a good proportion are in a foreign language. Here we have all the data, systematically arranged and available at a minute's notice. Those parts dealing with the stability relations of vitamins and their distribution in various foodstuffs, including the effects of various processing operations employed in the factory—such as canning, drying, preserving, heating—are of especial interest to the food manufacturer and his technical staff. (*"The Vitamins," by Ethel Browning, M.D. Pp. 607. Plates, 7. 1931. Published for the Pickett-Thomson Research Laboratory by Baillière, Tindall and Cox. Price 42s. net.*)

A New Automatic Pressure Retort



CONSIDERABLE interest attaches to a new form of fully automatic pressure retort designed and built by the L.C. Engineering Supplies, Ltd. It is a relatively cheap machine, simple in design, takes various shapes and sizes of cans, is readily accessible, and easily adjustable as regards time and temperature of processing. Its size being 8 ft. high and 13 ft. diam., it is economical in floor space. Heating is uniform and the movement of the cans is smooth, unless agitation is specially required.

The cans are conveyed from the closing machine to the feed port A, and by way of the slide valves B and C enter the feed chamber D (the trip rods F keep the cans from the face of the valves). Then a can is pushed forward by the feed piston E, is met by the scoop at the lower end of the conveyor unit H, and seated on one of the link pallets attached to the conveyor chain. A number of conveyor units are fixed to the drum I, rotated on the shaft J driven by worm gear. Discharge is effected by way of the discharge port L, through the valve M and into the discharge chamber O, which is flooded, and the cans are then ejected through the valve N into a tank and removed by a submerged conveyor which takes the cans through a cooling and drying tunnel.

Peas for Canning

In a recently issued publication by Sayne, Willaman, and Kertesz (*Tech. Bull.* 176, New York State Agricultural Experiment Station, March, 1931), entitled "Factors Affecting the Quality of Commercial Canning Peas," experiments are reported to determine what chemical changes in peas are associated with quality of the canned product. Tenderness was the principal quality factor studied. The effect of potash fertilisers on peas was studied to determine if the muriate form would cause hard peas.

Detailed chemical analyses are given showing the variations in the organic and inorganic constituents of peas due to differences in fertiliser treatment, time of harvesting, variety, and enzyme action after shelling. Great differences in the mineral content of peas and ratios of minerals were obtained, but the organic constituents varied but slightly. Large differences in the inorganic content of the leaves and stems may be produced, but the variations in the seeds and particularly the seed coats are very slight.

All lots were canned under commercial conditions, and the quality of the canned product judged by canned foods experts. Three deleterious changes take place in peas if not canned within a few hours after shelling—viz., increased toughness, increased calcium in the seed coat, and enzymic changes in the carbohydrates and nitrogenous constituents.

Differences in the proportion of calcium and potassium in the nutrient solution can cause an organic base exchange in which calcium may be partially replaced by potassium, and *vice versa*, in the composition of peas. The potassium and calcium content of peas was altered slightly by the application of potassium and calcium compounds to the soil. Tougher peas have higher calcium content.

Statistical analyses are given showing the differences in yield, chemical composition, and toughness of peas due to different fertiliser treatments. It is shown that potash fertilisers tend to reduce toughness of peas, and that the chloride form is not injurious. However, calcium chloride applied to the soil made peas tougher.

Changes in peas (ovules) as they mature include increases in dry matter, starch and protein-non-protein nitrogen ratio, and the migration of calcium to the seed coat, all of which tend to make the peas tougher. These changes can be measured by mechanical tests, which will predict canning quality. Various mechanical tests and indices of maturity are described. The use of a mechanical "quality index" is proposed to determine when fields should be harvested to obtain maximum yield and quality.

The following literature will be found useful:

Boswell, Victor R.: "Factors influencing Yield and Quality of Peas." *Maryland Univ. Bull. No.* 306, 1929.

Fonder, J. F.: "Variations in the Calcium and Magnesium Contents of Pea Plants on Different Soil Types." *Soil Science*, vol. 28, pp. 5-26, 1929.

Gowen, P. L.: "Effect on Quality of Holding Shelled Peas." *The Canner, Convention No.* 112, 1928.

Gowen, P. L.: "The Blanching of Peas." *The Canner, Convention No.* 100, 1929.

Hoagland, D. R.: "The Relation of the Concentration and Reaction of the Nutrient Medium to the Growth and Absorption of the Plant." *Jour. Agr. Res.*, vol. 18, pp. 73-117, 1919.

Kertesz, Zoltan I.: "The Chemical Changes in Peas after Picking." *Plant Physiology*, vol. 3, p. 399, 1930.

Kertesz, Zoltan I.: "Recalculated Tables for the Determination of Reducing Sugars by Bertrand's Method." Published by the author, 1930.

Lasausse, E.: "Das Aussieben der jungen eingemachten Erbsen." *Ann. der Falsification*, vol. 19, p. 28, 1926. *Zeitschr. Unters. Lebensmittel.*, vol. 59, p. 640, 1930.

Lee, Beatrice, and Priestley, J. H.: "The Plant Cuticle-I. Its Structure, Distribution, and Function." *Ann. Botany*, vol. 38, pp. 525-545, 1924.

Love, H. H.: "A Modification of Student's Table for Use in Interpreting Experimental Results." *Jour. Amer. Soc. Agron.*, vol. 16, pp. 68-73, 1924.

McGeorge, W. T.: "Organic Compounds Associated with Base Exchange Reactions in Soils." *Arizona Agr. Exp. Sta. Tech. Bul. No.* 31, 1931.

Muttelet, C. F.: "Einfluss der Reife auf die Zuzammensetzung der Erbsen." *Ann. der Falsification*, vol. 18, p. 5, 1925. *Chem. Centralblatt.*, 1925, I., 2120, 1925.

Sayre, C. B., and Nebel, B. R.: "Some Effects of Different Nutrient Solutions on the Structure, Composition, and Quality of Peas." *Proc. Amer. Soc. Hort. Sci.*, vol. 27, pp. 221-226, 1931.

True, R. H.: "The Significance of Calcium for Higher Green Plants." *Science*, vol. 55, p. 1, 1922.

Willaman, J. J.: "Correlation between Skin Texture and Flesh Texture in Plum Varieties." *Soc. Exp. Biol. and Med.*, vol. 23, p. 680, 1926.

Canned Foods and Health

THE following is abstracted from *New Health*, September, 1931:

"The preparation and sterilisation of canned foods are now carried out under such carefully controlled conditions that they can be regarded as safer in some cases than much so-called fresh food. Apart from the destruction of all micro-organisms present there is usually little, if any, change in the food value. Vitamin C, however, is apt to be reduced when foods containing it are subjected to heat such as is necessary when carrying out the sterilising process, although not to the same extent as in ordinary cooking, when the air has full access and oxidation changes can take place.

"While fresh foods must always have first place, tinned foods help to introduce variety, since out of season fruits and vegetables, for instance, can be provided when desired. This, in itself, means that they have a health value, for it is generally agreed among physiologists that, other things being equal, variety and change in the menu are desirable, even if they only help to create interest in one's food. In addition, tinned fruits and vegetables are preserved in prime condition and before being exposed to the deteriorating factors of marketing. Much 'fresh' produce on the market does not reach the consumer for days after being gathered, and loses correspondingly in health value."

Industrial Psychology

THOSE who are responsible for the packing departments of firms whose products are sent out in small packages would do well to read the address given by Mr. Seebohm Rowntree to the National Institute of Industrial Psychology on the results of vocational selection of workers. The whole point seems to be to find the right man for the right job and to eliminate all the square pegs from the round holes. The first step towards this is the application of methods of vocational selection. In Mr. Rowntree's firm they have used the vocational tests for more than seven years. Since the institution of these tests the proportion of misfits of employees who had to be dismissed or transferred before the end of their training period has fallen from 20 to 25 per cent. to 3 per cent. He maintained that vocational selection increases the earning power and contentment of the workers and indirectly reduces machine and other overhead charges. Another important point was the economies produced in training costs. Workers with a natural aptitude were very quickly trained, and while previously it took eighteen months to train a new worker at a cost of about £31 (the difference between what the worker was paid and what he actually earned) it could now be done in three and a half months at a cost of less than £5.

Other points raised by Mr. Rowntree were the steps which must be taken to encourage the workers to give their best. Reasonable wages and hours and security of employment were essential. A certain tapestry factory introduced two pauses of fifteen minutes and two of ten minutes into the working day. The working day was reduced from eight hours to seven hours ten minutes, but the output increased by ten per cent. and sickness was reduced by one-quarter.

We visited recently the packing department of a large firm of self-raising flour manufacturers where very large quantities of flour are packed in small bags, and we were struck by the smooth rhythmical movements of the girls. There appeared to be no hurry, no haste, but the bags of flour appeared almost as if by magic. This elimination of jerky, discontinuous movements was another of the points referred to by Mr. Rowntree. The lecture is full of interesting information and well worth the careful perusal of any manufacturer with a staff engaged on work of a routine nature.

Recent Publications

A Bibliography of the History of Agriculture in the United States. By E. E. Edwards. U.S. Dept. Agric. *Miscellaneous Publication*, No. 84. November, 1930. 307 pp.

Canning Fruits and Vegetables. By E. Elliot. Fruit Branch, Dept. of Agriculture. Pamphlet No. 100. Ottawa, 1929.

A pamphlet of 13 pages giving directions on domestic canning.

Canned Fruits and Vegetables for Variety in Everyday Meals. By E. Elliot. *Ibid.* Pamphlet No. 113. Ottawa, 1930.

This gives: (1) Regulations regarding canned fruit and vegetables in Canada; (2) ways of serving canned vegetables; (3) recipes for use with canned vegetables; (4) vegetable mixtures; and (5) fruit desserts.

Milling and Baking Qualities of World Wheats. By various authors. U.S. Dept. Agric. *Technical Bulletin*, No. 197, October, 1930.

This bulletin of 223 pages gives the results of work designed to evaluate the milling and baking properties of samples of wheat obtained by every producing country. Earlier attempts have not been successful because such data as are available have been obtained in many different laboratories which use widely different methods of analysis. A full description of the methods used is included.

The Citrus Rust Mite and its Control. By W. W. Yothers and A. C. Mason. *U.S. Dept. Agric. Technical Bulletin*, No. 176, May, 1930.

A detailed, illustrated account covering 56 pages. This mite probably ranks third among the injurious pests on citrus in Florida, the others being the purple scale and the citrus white fly. It is present over the entire citrus belt; on an average, more than 50 per cent. of the fruit is more or less injured by rust mites.

Some Mushroom Diseases and their Carriers. By V. K. Charles and C. H. Popenoe. *Ibid.* Circular No. 27. Issued February, 1928; revised September, 1930.

Describes the "bubbles" and the plaster-mould diseases and their control. Insect contamination in mushroom houses also receives attention.

Canadian Vegetables for Every Day. By E. Elliot. Pamphlet No. 121. *Ibid.* Ottawa, 1930.

Contains particulars relating to general preparation, cooking, and food value of vegetables, together with a number of special recipes.

New Canadian Cannery

THE Minnesota Valley Canning Corporation of Lesueur, Minnesota, U.S.A., has recently organised a Canadian subsidiary to be known as Fine Foods of Canada, Limited. The Canadian plant will be established at Tecumseh, near Windsor, Ontario, provided that a fixed assessment of $15,000 can be secured covering a period of ten years. A site of five acres has been selected, and the plant, when completed, will, it is claimed, be the largest vegetable cannery in the British Empire. The Canadian Company will pack only peas and corn grown from the company's own special seed strains, and contracts for the cultivation of 1,500 acres of these crops will be entered into during the present season. At five out-stations farmers will deliver peas on the vine, the seed to be threshed and then delivered to Tecumseh for canning.

Trade Notes

Automatic Can Seamers.

The Bliss automatic high speed body maker is designed for the high speed production of round, square, or irregular-shaped bodies. It has automatic feed, notching and soldering attachments, and in the production of round can bodies for sanitary cans, where it is most generally used, a speed of 300 a minute is consistently maintained.

The design and construction are such as to ensure maximum life. All motions are short and actuated by eccentrics, eliminating the wear, noise, and limitations as regards speed usually caused with cams. All working parts are open and readily accessible for inspection and adjustment for different sizes.

Inside or outside soldering horns are supplied according to requirements. Notching attachments, edging attachments, and forming wings, right and left hand, are driven by independent right and left shafts, so that the movements are direct, and "play" and "lost motion" are eliminated.

The double seamer embodies certain special features in the seam-forming mechanism which are claimed to add greatly to the simplicity and reliability of the machine.

The high operating speed is made possible by the multiple spindle, double turret construction, and the smoothness with which the can is carried through and transferred. The machine runs continuously (not intermittently), conveying the can at a uniform speed without stopping or jerking it at any point. Filled cans can be seamed at rates running from 80 to 150 every minute, depending on their contents, and empty cans may be turned out at the rate of 150 to 200 a minute.

For use in the can shop machine it is fitted with flanged plates on the lower base plates to protect the bottom flanges of the bodies. In packing house use, for filled cans, the machine is regularly equipped with friction dial feed and can timing mechanism, and knurled plates are used on the lower spindles.

* * *

British Association of Chemists.

London Section.—A smoking concert will be held at the Broad Street Station Restaurant (large room) on Friday, October 16, at 8 p.m. Members and friends will be cordially welcome, also non-members.

The annual dinner of the Association will be held at the Palace Hotel, Bloomsbury Street, W.C. 1., on Saturday, November 28, 1931, when it is hoped members will make a special effort to attend. Tickets, 10s. 6d. (exclusive of wine), may be obtained from the General Secretary, British Association of Chemists, Empire House, 175, Piccadilly, London, W. 1. A dance will follow the dinner.

All-British Steel Pulleys.

Messrs. W. H. Willcox and Co., Ltd., the well-known Southwark Street firm of engineers' storekeepers, announce that they now carry a large stock of all-British wrought steel pulleys, in sizes from 3-inch to 48-inch diameter, and with various size faces and bores. These pulleys embody an important improvement upon the usual American type, in that the arms are arc-welded to the rims. With the sole exception of the hub, not a single rivet is used, thereby prolonging the life of the belt, there being no rivets to project on the pulley face. Prices are competitive, and trade discounts will be quoted against enquiries. Messrs. Willcox's "Enginalities" also include a complete range of all transmission gear (of British manufacture), of which large stocks are also held.

* * *

The works of Messrs. Meldrums, Ltd., of Timperley, Manchester, have been busily employed during the past three months, orders for fifty plants of substantial size being received by them during that period.

The bulk of these were for refuse destructors combined with boilers or water heaters for the utilisation of the heat of combustion; mechanical stokers and forced draught furnaces for eliminating smoke and utilising cheaper fuel while giving increased steaming from existing boilers. An increased demand was also experienced for chemical plants in their well-known "Meldrum" acid-resisting metal.

* * *

Harco Products.

A new small pocket-sized catalogue, describing a large number of selected examples of their various metal products, has been issued by Messrs. G. A. Harvey and Co., Ltd., the well-known Greenwich metal-workers. The articles illustrated and described in this useful publication appear to cover the whole range of sheet and cast metal-work, and include tanks of all types and sizes, storage bins, underground storage tanks, abattoir equipment, wash boilers, piping and guttering, ventilators, and almost every conceivable type of perforated metal and wire-work. The very wide range of industrial plant—vacuum dryers, evaporators, stills, condensers, agitators, water-softening plants, etc.—for which Messrs. Harvey and Co. are equally well known are also briefly referred to in the catalogue (No. 525), which is available to interested readers on request.

* * *

Canning Brine-Frozen Mackerel.

The Dominion Department of Fisheries at Ottawa has forwarded to the Reference Library at Canada House, Trafalgar Square, London, S.W. 1, *Bulletin* No. XXIV. of the Biological Board of Canada, entitled "The Canning of Brine-Frozen Mackerel," by Ernest Hess.

The booklet in question describes the method suggested for rapid-freezing fresh mackerel in order to provide stock for canneries. In view of the sporadic character of the mackerel catch, it would not be practicable to have a cannery of large enough capacity to handle the fish absolutely fresh, and the method of brine-freezing is expected to enable the industry to handle a larger quantity of fish by spreading the canning operation over a longer period.

* * *

Italian Tomato Production.

It is reported that Italian production of tomatoes this year will be considerably reduced. Owing to the low prices realised last year, the acreage devoted to tomato growing during the current season was curtailed by the growers. On top of this the summer has been unusually dry, with drought conditions in certain tomato growing regions, with the result that the yield of fruit is considerably below normal. The outlook for the supply of tomatoes for canning, therefore, is unsatisfactory, and it is believed that a considerable proportion of canning factories will not have a sufficient supply of raw tomatoes for their operations and will, in consequence, reduce their working schedule.

* * *

South African Crayfish Canning.

The decision of the Government to grant another crayfish canning concession at Lambert's Bay probably marks a further extension of the industry, according to information furnished the Department of Commerce by American Consul C. M. P. Cross, at Cape Town, South Africa. This industry has recently been suffering from world depression and declining prices. The association, however, which has been maintaining prices for the past two years, is still operating effectively, and profits are still being earned. The dependence of the industry upon the French market is now causing anxiety, and efforts are being made on the American market, where it enjoys a substantial price advantage over the American lobster.

* * *

Edible Soya Flour.

The pure edible soya flour (Soyolk) with a 20 per cent. fat content, prepared from the soya bean by the Berczeller process, is meeting with a ready response from many of the leading food manufacturers in U.S.A. After importing Soyolk from the British com-

pany for just over one year, the American concessionaires operating this process, we are informed, have commenced milling activities in a large plant at Nutley, New Jersey, and are supplying numerous bakers, confectioners, and food manufacturers with their product, known under the trade name of Soyex.

* * *

Apart from the established outlets for this flour in the bakery and confectionery trades, there is now an immense consumption by American manufacturers of macaroni, spaghetti, and noodles. It has been found that by incorporating Soyex they are able to convert what was previously an almost entirely starch food into a more balanced and easily digestible product of improved palatability and nutritive value. Manufacturers of macaroni and allied products deem it advisable, in some instances, in marketing their foods, to make specific mention of the incorporation of Soyex in their goods. Similar reasons have led to the employment of this flour in the preparation of soups, salad dressings, sauces, potted meats, sausages, and a great variety of other food products, and the enhanced digestibility, etc., are being advertised to the public.

* * *

Soyolk in Health Drinks and Foods.

A new field which Soyolk is said to be invading is that of the ready-to-take health food drink. With its 45 per cent. protein, biologically on a par with animal and egg protein, its 20 per cent. fat, its vitamins A, B, D, and E, and, of course, the valuable lecithin, phosphate, and mineral salt content, it forms, in combination with such ingredients as milk powder, malt, cocoa, sugar, and flavouring, an ideal health food drink.

* * *

A breakfast food in which soya bean flakes or puffed beans appear is one of the latest applications of this valuable food material, and salted soya beans promise to compete with salted almonds, the new invader being not only considerably cheaper in cost, but also easier to digest.

English manufacturers will not be slow to follow the lead given by those in the American food industry, and will doubtless themselves utilise the edible soya flour as a means of enhancing the food values of their products, at the same time in most cases effecting substantial economies in manufacture.

* * *

Transfer of Agency.

Messrs. Rappings, Ltd., inform us that as from the 1st of October last they took over the machinery department of the Wraptyn Co., Ltd., of Walbrook, E.C. 4. Consequently the sole British Empire agency for the "MFM" wrapping and packing machines and "Rost" plastic machines, previously held by the Wraptyn Co., will now be held by Messrs. Rappings, Ltd., who have retained Mr. L. J. Claridge, of the former firm, in control of their new machinery department.

* * *

Mr. George A. Phillipson, M.I.Min.E., formerly technical representative for the Coppée Company (Great Britain), Ltd., has joined the Steel Band Conveyor and Engineering Co., Ltd., of Birmingham, to represent them in London and the South for mechanical handling schemes for all industries and to be generally available for such schemes in connection with collieries, coke ovens, gas works, and iron and steel works.

Mr. Phillipson will continue to reside in London, and entered on the new arrangement early in October.

* * *

The Canning Convention.

The latest type of can cases, as used by the most progressive American and British canners, will be a principal feature of the display arranged by the Thompson Norris Co., Ltd., at Manchester. This firm have manufactured corrugated fibre-board products for the past fifty years, and their exhibit will lay special emphasis on the sound features which this long experience has enabled them to build into their products.

* * *

Messrs. Hugh Stevenson and Sons, Ltd., of Victoria Works, Manchester, will show a comprehensive range of cartons, and boxes, etc., for packing food products. The types on view will include special types for such lines as nuts, dates, and raisins; a wide range of suitably printed circular boxes, as used for fig packing and similar containers for preserved fruits, and specimen trays for fruit jellies.

* * *

Waxed Papers for Packing and Wrapping.

A very attractive and comprehensive catalogue of patterned and plain waxed papers has been issued by Messrs. Cats Bros., Ltd., of Walbrook. These papers are now used very extensively by the food manufacturing industries for wrapping both completed cartons or piece goods and as protective linings for patent foods, cereals, and similar packaged goods. The specimens in the catalogue, which include almost every variety of pattern, tinted or plain sheets, reveal that besides their utilitarian and hygienic value, waxed papers can be made exceedingly attractive as a packaging material.

* * *

Cold Water Powder Glues.

Cold water soluble glues in powder, of vegetable origin, are now being marketed by W. A. Scholten's Chemical Works, Ltd., of Groningen, Holland, who claim that their products are very efficient when simply stirred into cold water, having excellent adhesive qualities and immediate readiness for use. The adhesives are said to be much more economical than animal glues, and also glues in liquid and paste form. These adhesives are soluble in 12 to 15 and even more times their own weight of water, so 1 cwt. of adhesive in powder represents 13 to 16 or more cwts. of liquid glue.

The products, the makers state, are tasteless, odourless, and non-hygroscopic. They are adapted for use with the most varying materials, such as glass, tin, wood, paper, cloth, leather, etc., and can, they state, be employed on all machines previously fed with ordinary adhesives. They are ideal cold glues for labelling on bottles, tins, etc.; special qualities are delivered for sensitive and fine-tinted papers.

The adhesives are also recommended for use in tropical countries. Being dry powders, the products are not subject to deterioration, but can be kept for an unlimited time, if stored in a dry place. Readers can obtain free samples on application to the makers, as well as full particulars and special information regarding their use in any special business.

* * *

Congratulations.

We note that a great honour was conferred on the Dewey and Almy Chemical Co., Cambridge, Mass. (of which the English branch is Dewey and Almy, Ltd.) by the National Research Council of U.S.A., by including the firm's laboratories among those selected for a visitation by a special group of industrial executives. This company, it will be recollected, have made important contributions to the canning and glass-packing industries in their manufacture of can sealing compounds, soldering fluxes and adhesives for labelling.

* * *

Improved Transport.

Anything which serves to cheapen and facilitate transport of goods is worthy of serious attention, and this applies to the "Road-Rail Container" introduced by the G.W.R. These containers, open or closed, are of 2½, 3, and 4 tons capacity. The goods are loaded on the sender's premises into the container with the minimum of packing, which is conveyed to his customer by Express Freight Services without intermediate handling and with the minimum risk of damage and the most rapid transit possible.

* * *

Frozen Fish.

On June 7, 1931, fish subjected to quick freezing was put on sale for the first time in the city of Buenos Aires, after this process had been tried for thirty days. The shipment was made from Mar del Plata in accord with a campaign initiated by the sanitation authorities some time ago. The shipment was made to the "Bullrich" wholesale fish market for sale to the

retailers, who in turn sold it to the general public at the various retail markets and municipal fairs in Buenos Aires. The Director of Public Health, together with a commission from the Department of Public Health, was at the market to inspect the fish.

* * *

New Zealand Pig Industry.

The New Zealand pig industry has always been handicapped by the high duties operating on grain feeds. Efforts are being made throughout New Zealand to have the duties removed, and it seems likely that this may shortly eventuate. An unlimited market for pigs exists in Great Britain, whose annual imports amount to about £58,000,000. New Zealand supplies less than £500,000 of this total. Should the duties on grain feeds be removed, New Zealand would undoubtedly be able to increase her pig exports.

* * *

Bacon Imports.

The following table shows imports of bacon into the United Kingdom during the first six months of 1931, with comparative figures for 1930:

	January to June.	
	1931.	1930.
	Cwts.	Cwts.
Irish Free State	103,633	148,143
Denmark ...	3,537,018	2,692,310
Netherlands ...	540,704	428,962
Poland	534,977	214,444
Sweden	311,580	250,252
Lithuania ...	135,193	12,763
Russia	10,281	42,530
United States ...	121,280	332,128
Other countries ...	107,154	129,723
Totals	5,401,820	4,251,255

* * *

U.K. Imports of Hams.

The following table shows the imports of hams into the United Kingdom during the first six months of 1931, with comparative figures for 1930:

	January to June.	
	1931.	1930.
	Cwts.	Cwts.
Canada	27,650	39,844
Irish Free State ...	6,832	6,527
Poland	49,158	18,057
United States ...	310,170	438,043
Argentina	7,274	5,382
Other countries ...	5,336	4,015
Totals	406,420	511,868

* * *

The largest producing centre for marmalades is the district surrounding the city of Magdeburg, in which about 25 per cent. of the total German production of this commodity is manufactured.

* * *

Production of Processed Cheese in Canada, 1930.

The production of the soft cheese, termed "processed cheese" in Canada, in 1930 amounted to 14,633,733 lbs., and the exports to 1,627,925 lbs. Processed cheese is made from ordinary Cheddar cheese, and the process is stated to consist of grinding the cheese, heating it in a jacketed container with agitation, and filling it into the proper receptacles, either directly or with specially designed machinery. The number of firms reporting the production of this cheese in 1930 was eight, of which six were located in Ontario and one each in Quebec and Alberta.

The output of processed cheese in 1930 is the smallest shown for any year since 1924, the first year for which complete statistics are available. The record year of the period was 1925, when the production reached a total of 32,652,569 lbs.

The following table gives statistics of production and export for the years 1924 to 1930:

Year.	*Production.*	*Export.*
	Lbs.	Lbs.
1924 ...	16,893,823	not available
1925 ...	32,652,569	21,381,532
1926 ...	20,298,428	10,872,755
1927 ...	15,386,617	3,725,244
1928 ...	19,781,066	6,719,428
1929 ...	17,707,822	3,800,160
1930 ...	14,633,733	1,627,925

* * *

South African Fish Industry.

During the past six months the stock fishing industry has been at a very low ebb. The market for fresh fish is small and the problem of distribution over great distances in a warm climate is very great. A considerable portion of the catch of stock fish is smoked or dried in the form of fillets, and during prosperous times Australia has been an important purchaser. The collapse of the Australian exchange has practically stopped all exports, and there is no indication of any revival. An export business has also been built up in frozen stock fish for the Australian market, and this has suffered even more than the trade of smoked fish.

Dried snoek forms one of the staple foods of the farm labourers throughout the Cape Town district. It is also being exported in increasing quantities to adjoining countries, principally Mauritius. The quality of this fish is not such as to recommend it to cultivated tastes, but it possesses the quality of cheapness and is therefore saleable. The present season, as far as the Cape and immediate vicinity is concerned, has been distinctly disappointing, as the arrivals of shoals from the west coast were late and their stay has been short. Operations, therefore, on the west coast have been more successful, and the short catch is being made up to some extent by higher prices than would otherwise prevail.

Normally the crayfish industry in Cape Town is the most active of the fishing undertakings. During 1930, in spite of the adverse economic conditions prevailing, the exports actually increased in volume. During the year the French market took probably 75 per cent. of the exports, and, in addition, bought 90 per cent. of the shipments made in the United Kingdom. The crayfish is also still consumed in Belgium and elsewhere in Europe. There have also been successful shipments for a number of years to the United States. (Report from the U.S. Consul at Cape Town.)

Roadside Service.

A neat tray, fitting on the side of the car, enables these motorists to enjoy their refreshments without leaving the car.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below willbe passed on to the enquirers. **N.B.—Enquirers are requested to use the special form in the advertisement section.**

386. *We note in your September issue an article on "Banana Flour." We are interested in this, and shall be glad if you can advise us where this article can be obtained.* (Birmingham.)

Information supplied.

387. *Required, the address of the "British Transparent Paper Co., Ltd."* (Dublin.)

388. *Some time ago a product named "Gelozone" was offered in your journal. Will you please supply name of firm manufacturing this?* (Hamburg.)

Messrs. Whiffen and Sons, Ltd., of Fulham, London.

389. *At present it is impossible to obtain mono-sodium glutamate in New Zealand. Could you advise us from whom this product is procurable, as we would like to try it out in connection with gravy powder?* (New Zealand.)

Information supplied.

390. *We would appreciate if you could tell us who would supply a glucose caramel that would be suitable for a gravy powder.* (New Zealand.)

Information supplied.

391. *With reference to enquiry No. 331 (August issue), there is no reason in the world why a citrus fruit marmalade should necessitate the use of a citrus pectin, because pectin is pectin, no matter from what source it is extracted. Of course, pectins from different sources will act a little bit different, probably due to some of the impurities which are precipitated with some of the pectins that are not as pure as they might be.* (Kansas City.)

392. *Required, names and addresses of makers of toffee trays and 7-lb. sweet tins.* (Devon.)

Information supplied.

393. *We should be glad if you would supply us with a list of makers of machines for making beef cubes.* (York.)

Information supplied.

394. *Would you please give us a good recipe for making Worcester sauce?* (Buenos Aires.)

Information supplied.

395. *We beg to enquire whether you can give us some information on the packing of chickens in boxes?* (Norway.)

Referred to page 64, March, 1930, and page 100, April, 1930, of this journal.

396. *Will you be good enough to give us the name of the maker of the machines illustrated in the article on "Crustless Cheese," published in the July, 1931, issue, especially of the automatic machine, Fig. 4, page 204?* (Australia.)

Information supplied.

397. *Can you let us have a recipe for an invalid food to contain malt extract, meat extract, and eggs?* (London.)

To comply with this request satisfactorily more particulars are needed as to detailed requirements. Considerations of price, quality, output, market in view, and so on, enter into the question. Certainly a series of trials and samples would have to be made. A suitable person for carrying out such work was recommended.

398. *Kindly furnish us with names of firms able to supply a cherry stoning machine.* (London.)

Information supplied.

399. *Required, name of firm able to supply tomato purée.* (London.)

Information supplied.

400. *Where can we obtain acid-resisting jugs suitable for vinegar and acetic liquors? Must be unbreakable when dropped on a hard floor. Stainless steel would do if delivery could be made from stock, otherwise it would be too expensive. Possibly hard rubber would be suitable. Size: pint and quart.* (London.)

Recommendations made.

401. *Names and addresses wanted of firms who could supply banana flour.* (Glasgow.)

These were supplied.

402. *Will you be good enough to put us in touch with the packers of fruit, fish, etc.? We have a big connection with fruiterers, grocers, fishmongers, and butchers, and wish to add to our lines.* (Bristol.)

403. *Names of firms required able to supply machinery for producing potato crisps.* (London.)

Information supplied.

404. *Names of firms required making food drying plant.* (London.)

Information supplied.

405. *We would feel obliged if you could supply us with formulæ for making ice-cream powders containing gelatine.* (London.)

Formulæ submitted:

Mix I.	*Lb.*
Full cream milk ...	62·33
50 per cent. cream ...	19·88
Skim milk powder ...	3·69
Sugar	13·50
Gelatin (pdr., good quality	00·50

Mix II.	*Lb.*
Full cream milk ...	70·07
Butter (unsalted) ...	8·83
Skim milk powder ...	4·00
Sugar	13·50
Gelatin	00·50
(Needs emulsifier or viscoliser to compound.)	

Mix III.	*Lb.*
Full cream milk ...	71·00
50 per cent. cream ...	11·13
Skim milk powder ...	3·27
Sugar	13·50
Gelatin	00·50

Mix IV.	*Lb.*
Full cream milk ...	68·50
50 per cent. cream ...	8·50
Condensed whole sweetened milk ...	13·70
Sugar	8·40
Gelatin	00·50

Mix V.	*Lb.*
Full cream milk ...	46·15
50 per cent. cream ...	20·60
Condensed unsweetened skim (3 to 1)	10·25
Sugar	13·50
Gelatin	00·50

Above mixes give following analyses:

Analysis.	*Mix Number.* 1.	2.	3.	4.	5.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Butterfat	12	10	8	8	12
Milk-solids-not-fat	10	10·5	10	9·90	10
Sucrose	13·5	13·5	13·5	13·5	13·5
Gelatin	0·5	0·5	0·5	0·5	0·5
Total solids ...	36·0	34·50	32·00	31·90	36·00

406. *We were extremely interested in your editorial remarks on page 246 of the September issue, in which you refer to a progressive packing firm situated in the Midlands. We wish to represent a progressive British packing house, as with an extension of the present British preferential tariffs, which we all hope for, we shall expect most business to be diverted to the Dominions and the U.K.* (West Indies.)

The information requested was supplied.

407. *Please furnish names and addresses of houses supplying egg and egg substitute in bulk.* (Lincolnshire.)

Information supplied.

408. *Could you advise us the process and what machinery is required for the canning of pilchards, mackerel, and sprats?* (Cornwall.)

Information supplied.

409. *Could you inform me where information may be obtained concerning the process and machinery used in canning herrings and sprats?* (Scotland.)

There is some information given in the present issue of this journal. Other sources are the makers of the plant used (names of which were supplied to the enquirer) and the following literature:

"The Canning of Fishery Products," by John N. Cobb (1919).

H. R. Beard, "Preparation of Fish for Canning as Sardines," U.S.A. Dept. of Commerce, Bureau of Fisheries, Document No. 1020 (1927).

Various short reports issued by the Department of Commerce, Bureau of Fisheries, Washington, U.S.A.:

Mem. S. 274: "California Sardine Canning Methods."
Mem. S. 245: "Sardines from the Norwegian Sprat."
Mem. S. 50: "French Method of Canning Sardines."
Mem. S. 81: "Sardine Industry in Southern California."

"The Methods of Fish Canning in England." Fishery Investigations, Series 1, Vol. II., No. 1 (1921). 2s. 6d.

410. *Kindly supply particulars of a Cold Ice-Cream Powder which, mixed with cold milk alone, will give a product ready to freeze.*

The chief difficulty in such a preparation is that of stabilisation. Gelatin is useless, as its rate of solubility in cold aqueous solvents is far too slow. Such preparations as are on the market most probably use gum tragacanth in finely powdered form as the stabilising agent, though simple mixtures of starch and sugar have been mooted as powder for making an uncooked mix. Simple sugar with farinaceous mixtures plus milk cannot avoid resulting in a coarse, icy product, and it is my opinion that a cold mix, however compounded, must be always inferior as regards texture and general palatability to a properly heat-compounded, gelatin stabilised product. A theoretical point of view should suggest something of the nature of the following as a basis for experiment.

Prepare a powder as follows:

	Lb.
Powdered sugar	12
Skim milk powder	1
Fine powdered gum tragacanth	1
Fine powdered rice flour	1
Vanillin	q.s.

Thoroughly intermix and incorporate the above, sieving to give a fine powder. Then to each one gallon of full cream milk add, say, 2 lbs. of above powder. First with a little of the milk, making a paste, and then gradually add remaining milk, finally thoroughly agitating whole for some minutes. Set aside an hour or two to allow gum to absorb water and then freeze. A fairly good textured product should result. If too coarse, increasing tragacanth content, or time of "ageing," or addition of powdered agar might be tried. Slight increase of skim milk powder may be beneficial.

The analysis of a frozen confection so compounded would be somewhat as follows:

	Per Cent.
Butterfat	2·90
M.S.N.F.	8·30
Sucrose	13·30
Rice flour	1·10
Gum tragacanth	1·10
Total solids	26·80

It is, of course, a badly balanced mix deficient in butterfat, which deficiency could be made good by the addition of cream; even so, approximate balance only could be so secured.

The possibility of a legal minimum of 8 per cent. or so fat should not be lost sight of by anyone intending marketing a product such as proposed above.

E. H.

Fluorescent Indicators

DIFFICULTIES have been experienced for a long time in the determination of the acidity of red wines, and invariably the titration of red wines in presence of litmus or phenolphthalein gave high values. It has recently been found that if the fluorescent indicator umbelliferone is used, results closely agreeing with the theoretical acidity as determined by potentiometric titration are obtainable. The method is briefly as follows: 5 c.c. of the wine, freed from carbon dioxide by agitation in a vacuum, are diluted to 100 c.c. and treated with 2 to 5 drops of alcoholic umbelliferone solution of 1 in 100,000 concentration. The flask is placed in a dark room in the path of the rays from a silica mercury vapour lamp of the Westinghouse type working at 110 volts. This lamp is enclosed hermetically in a box furnished with a window of Wood's nickel oxide glass which allows of the passage of only ultra-violet light of wavelength above 0·35μ. Whilst exposed to this light the liquid is titrated with 0·1 or 0·05N sodium hydroxide until it just exhibits blue fluorescence. If acridine is used in place of umbelliferone the initial green fluorescence changes suddenly to indigo blue on titration at pH 4·9. These indicators cannot be used in the case of beer, as this liquid itself produces an intense fluorescence in Wood's light.

Specially constructed cabinets made for ultra-violet light determinations are on the market in this country, and there can be no doubt about their great value in analytical work. Apart from the use in titrations of muddy or coloured liquids, many other useful points may be noted by the examination of substances in ultra-violet light, as we pointed out in the December, 1930, issue. The method is extremely useful in some cases for the detection of impurities and the appearance of apparently pure white caustic soda sticks purchased as chemically pure, but which contained traces of sulphide, was really remarkable.

New Companies

POPNUTS, LIMITED. (259271.) 39, Mitchell Street, E.C. 1 To carry on the bus. of mnfrs. and exporters of popnuts, popcorns, and other confectionery, etc. Nom. Cap.: £2,000 in £1 shares (1,200 founders' and 800 ordinary.)

REYNOLDS, STOTT AND HASLEGRAVE, LIMITED. (259316.) To take over the bus of millers, etc., cd. on by Reynolds, Stott and Haslegrave, Ltd., at West Riding Mills, Wakefield, and elsewhere. Nom. Cap.: £36,000 in £1 shares.

BODENS (LINCOLN), LIMITED. (259257.) To carry on the bus. of mnfrs. and wholesale druggists and perfumers, mnfg. and wholesale confectioners, etc. Nom. Cap. £12,000 in £1 shares.

DORSET BACON COMPANY, LIMITED. (259231.) The Estate Office, Iwerne Minster, Dorset. To take over the bus. of an animal breeder, bacon importer, etc., cd. on at Iwerne Minster, Dorset, by the Hon. R. F. Watson. Nom. Cap.: £6,000 in £1 shares.

CHURCH AND PICKERING, LIMITED. (259228.) To carry on the bus. of wholesale grocers and confectioners, etc. Nom. Cap.: £1,500 in £1 shares.

WHITSTABLE BOTTLING COMPANY, LIMITED. (259321.) To mnfre. aerated and mineral waters; to carry on the bus. of mnfrs. of and dlrs. in siphons, bottles, etc. Nom. Cap.: £3,000 in £1 shares (100 ord. and 2,900 pref.).

EASTERN IMPORTS, LIMITED. (259204.) 141, Moorgate, E.C. 2. To carry on the bus. of mchts., traders, commission agents, etc., in the U.K., India, or elsewhere. Nom. Cap.: £1,000 in £1 shares.

ANGLO-FRENCH MADAGASCAR COMPANY, LIMITED. (259486.) 60, Fleet Street, E.C. 4. To acquire the right to purchase the assets of the bus. of "Cote Este Madagascar," and to carry on the bus. of dlrs. in pea-nuts, tapioca, coffee, etc. Nom. Cap.: £1,000 in £1 shares.

NORFOLK CANNERIES, LIMITED. (259378.) To carry on the bus. of canning and dealing in food, etc. Nom. Cap.: £600 in 500 pref. shares of £1 and 2,000 ord. of 1s. Permt. dirs.: F. U. Corbett. Subs.: A. W. Slade, 73, Nichols Square, E. 2. (clk.); C. G. Cave, 21, Cholmondeley Avenue, N.W. 10 (clk.).

RIVIERA CONFECTIONERY WORKS, LIMITED. (259473.) To take over the bus. cd. on at South Milton Street, Plymouth, Devon, as "The Riviera Confectionery Works." Nom. Cap.: £2,500 in £1 shares.

GRAPE PRODUCE (1931), LIMITED. (259390.) To carry on the bus. of brewers, grape and vine mchts., etc. Nom. Cap.: £100 in £1 shares. Dirs.: To be appointed by the subs. Qual. of dirs.: One share.

H. MOORE (CONFECTIONERS), LIMITED. (259368.) To take over the bus. of a baker and confectioner cd. on at 91 and 92, Far Gosford Street, and elsewhere in Coventry, by H. Moore. Nom. Cap.: £1,000 in £1 shares.

JONES AND SONS (HANLEY), LIMITED. (259339.) To take over the bus. of beverage brewers cd. on by J. H. Jones and Sons (Beverages), Ltd., at Stoke. Nom. Cap.: £1,000 in £1 shares (795 pref. and 205 deferred).

MRS. CAMPBELL'S PRESERVES, LIMITED. (259342.) Kingswood Poultry Farm, Lower Kingswood, Tadworth, Surrey. To take over the bus. of a mnfr. of and dlr. in preserves, condiments, etc., cd. on by Georgina A. Campbell at 4, Kenley Walk, Cheam, Surrey.

SHROPSHIRE WHOLESALE DAIRIES, LIMITED. (259248.) To take over the bus. of wholesale milk and dairy produce dlrs. cd. on at the factory of Midland Dairy Farmers, Ltd., in Lennox Street, Birmingham. Nom. Cap.: £5,000 in £1 shares.

POLISH BACON CORPORATION, LIMITED. (259379.) To promote the export of Polish bacon and other agricultural products to Great Britain, etc. Nom. Cap.: £5 in £1 shares.

LYSONS SON AND CO. (FRUIT BROKERS), LIMITED. (259310.) 36 and 37, Steward Street, E.C. To carry on the bus. of fruit growers and mchts., etc. Nom. Cap.: £500 in £1 shares.

The Preservation of Meats (*Continued from page 320*)

in clear cold water, stirring up occasionally to allow even absorption of water.

Never use the water, in which gelatine has been soaked, to make jelly solution. This water, it will be found, will be contaminated with sulphur dioxide, and many of the impurities in the gelatine, depending on the time the gelatine is allowed to soak.

Always remove gelatine from the soaking water before melting into stock, and use fresh water for dissolving.

When melting, keep the jelly well stirred, and do not maintain the temperature higher and longer than is absolutely necessary, as this destroys the strength. If jelly is to be held over from one day to another, cool as rapidly as possible, and cover when cold.

Remember that heat destroys jelly strength, and warmth allows mould and bacteria to multiply rapidly. Gelatine is an excellent bacteriological medium, and should therefore be treated with appreciation of this property.

A sample of gelatine should always be treated under practical conditions, and put to a practical test, before the consignment is purchased.

Generally a 1 lb. sample will be sufficient. This should be washed, soaked, and dissolved in exactly the manner as would be the case in the works. The gelatine stock should then be poured on to several glasses and tins of meat, and processed.

This is necessary, as one cannot tell, positively, what a gelatine will do under manufacturing conditions from chemical and bacteriological analyses.

(*To be continued.*)

Developments in Fish Canning Equipment (*Continued from page 325*)

siderable saving in freight is attained, as 7½ cases, or 360 flat bodies, can be shipped in one regular salmon case holding only 48 made-up cans. The canner, of course, has an added expense in connection with finishing these cans, but the smaller storage space required, together with the freight saving, is well worth while. An added advantage is also secured in reduced handling expense, as the cans are generally formed, flanged, and one end applied just as they are needed in the cannery. They are finished and automatically conveyed directly to the filling machine.

Financial News

(SPECIALLY COMPILED BY S. HOWARD WITHEY, S.F.INT.A.C., F.C.I., ETC.)

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930–1931)

1930.	February 6	4½ per cent.
,,	March 6	4 ,,
,,	March 20	3½ ,,
,,	May 1	3 ,,
1931.	May 14	2½ ,,
,,	July 23	3½ ,,
,,	July 30	4½ ,,
,,	September 21	6 ,,

The past year has been a difficult period for food merchants and produce brokers, and it is not surprising that profits should show a substantial decline in relation to the previous year's results. As compared with a net profit of £209,641 realised by **Goldsbrough, Mort and Co., Ltd.,** in 1929-1930, the audited accounts of this company covering the financial year ended March 31 last disclose a net profit of £117,476, to which, however, must be added the substantial sum of £110,101 brought forward from the previous appropriation, giving a disposable balance of £227,577. Formed in 1881, the company has an authorised share capital of £2,400,000, divided into £1 shares of one class, all of which have been issued and paid up. Last year a dividend of 10 per cent. was distributed, but owing to the decrease in the profit margin the rate has been reduced to 5 per cent., the final account being made up as follows:

	£	£
Brought forward from 1929-1930	110,101	
Net Profit—year ended March 31, 1931	117,476	
Disposable Balance		£227,577
5% dividend on £2,400,000 Shares of £1 each		120,000
Allocated to Provident Fund		2,500
Carried forward to 1931-1932		105,077
		£227,577

The principal balance sheet items are enumerated below:

	March 31, 1931. £
Advances on Produce and Properties	5,608,741
Investments	299,316
Cash and Deposits	31,666
Creditors, Accrued Interest, etc.	946,175
Reserve Funds	1,965,000

There is £838,235 of 4 per cent. "A" debenture stock outstanding, recently quoted at 60, also £580,467 of 5 per cent. debenture stock. The shares are marked at about 17s.

The final accounts of **Sudan Salt, Ltd.,** are made up to March 31 each year, and are usually submitted in September, and during the past financial year a loss of £11,295 is revealed. At March 31, 1930, the sum of £6,369 stood to the debit of the general expenditure account, which will now show a balance of £17,664. This company was registered in 1929, the authorised share capital being £250,000 in ordinary shares of £1 each, of which £180,000 has been issued and paid up, including £12,500 issued to the Port Sudan Syndicate, Ltd., £7,000 issued to contractors in part payment for the erection of salt works, and £160,500 issued privately at par.

An interesting report is that of **Initial Services (1928), Ltd.,** whose organisation provides regular services of food, etc., to offices and business houses in London and the provinces. With other income, the gross profit for the year ended June 30 last amounted to £217,733, or an increase of £2,201 in relation to the previous year's figure, and after debiting fees and depreciation the net profit worked out at £210,542 as compared with £210,483 for 1929-1930. The ordinary dividend has consequently been maintained at the satisfactory rate of 50 per cent., less tax, absorbing £95,625, but, instead of further reducing the book value of goodwill, the reserve allocation has been increased by £15,000 to £45,000 and an increased amount carried forward to the next account. The entire authorised share capital of £625,000 has been issued and paid up, and consists of £400,000 in 8 per cent. cumulative preference shares of £1 each and £225,000 in ordinary shares of 1s. each, the final account for 1930-1931 being balanced as follows:

	£	£
Brought forward from 1929-1930	15,436	
Net Profit—year ended June 30, 1931	210,542	
Disposable Balance		£225,978
Allocated to Taxation Reserve		36,044
8% dividend on £400,000 Cumulative Preference £1 Shares		32,000
33⅓% interim dividend on £225,000 Ordinary 1s. Shares	£75,000	
Less Tax at 4s. 6d. in the £	16,875	
		58,125
16⅔% final dividend on £225,000 Ordinary Shares, tax free, making 50% for the year		37,500
Transferred to Reserve		45,000
Carried forward to 1931-1932		17,309
		£225,978

The general reserve will now amount to £100,000.

During the twelve months which terminated on March 31 last a loss of £3,445 was sustained by **Sodax (1929), Ltd.,** compared with a loss of £31,286 for the initial period from January 15, 1929, to March 31, 1930. The company specialises in apparatus for the manufacture of aerated water, and the authorised share capital is £150,000, of which £115,647 has been issued and called up in the form of 5s. shares of one class. The debit balance now amounts to £34,731, which is carried forward to the next account.

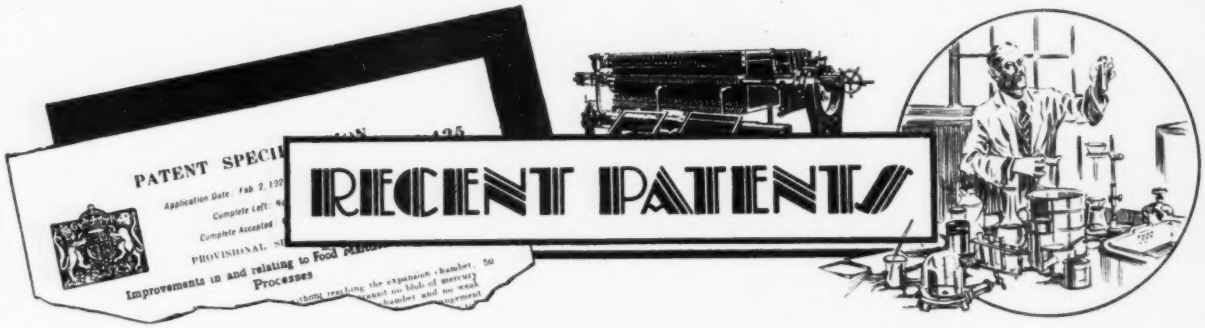
The **Aberdeen Preserving Co., Ltd.,** reports a loss of £5,397 for the financial year ended March 31 last, thereby converting a credit balance of £1,998 into a debit of £3,399, which is carried forward. Registered in 1920, the company has an authorised share capital of £100,000, divided into shares of 10s. denomination, but only £25,005 has been issued and paid up.

Compared with £1,968 realised during 1929-1930, the net profit of £4,433 shown in the profit and loss account submitted by **Cramphorn, Ltd.,** is very satisfactory and enables the ordinary dividend of 6 per cent. to be maintained for the third successive year. Of an authorised share capital of £51,000, a total of £42,000 has been subscribed and paid up, comprising £19,692 in 5 per cent. cumulative preference shares, £21,308 in ordinary shares, and £1,000 in deferred shares, all of £1 each. After allocating £500 to the benevolent and pensions fund and transferring £1,000 to reserve, as in 1929-1930, the balance is carried forward to the 1931-1932 account. The company's financial year ends on June 30, the audited accounts being usually submitted in September.

During the twelve months ended June 30 last a profit of £1,593 was realised by **R. Middlemass and Son, Ltd.,** biscuit manufacturers, of Edinburgh, thereby increasing the credit balance from £3,059 to £4,652, which is carried forward. The paid-up capital of this company was formerly £80,000, but in 1917 the amount was reduced to £30,000, comprising £20,000 in 6 per cent. cumulative preference shares of £5 each and £10,000 in ordinary shares of £2 10s. each.

STOCK AND SHARE LIST

	Oct., 1931.	*Par Value.*	*Sept.*, 1931.
Aerated Bread: Ord. ...	19/3	£1	18/-
6½% Pref.	20/3	£1	21/3
Apollinaris: Ord.	4/6	£1	4/3
Assoc. Biscuit: 6½% Pref. ...	22/6	£1	22/9
Avery (W. and T.): Ord. ...	45/-	£1	45/-
5% "A" Pref.	4½	£5	4½
5½% "B" Pref. ...	19/6	£1	20/-
Benger's Food: Ord. ...	28/-	£1	28/3
6% Pref.	4⅝	£5	5⅛
Bovril: Ord.	24/-	£1	23/10
Deferred	34/6	£1	31/-
6% Pref.	22/6	£1	22/7
4½% Deb.	92	£100	92
British Aluminium: Ord. ...	27/6	£1	27/3
6% Pref.	19/6	£1	20/-
British Thomson Houston:			
7% Pref.	22/6	£1	22/9
Bucknall (H.) and Sons:			
Ord.	23/9	£5	22/-
Cadbury: 6% Pref.	23/3	£1	23/9
8% 2nd Pref.	27/6	£1	28/9
Callard, Stewart and Watt:			
6% Pref.	16/9	£1	16/10
Carrs: 6½% Pref.	18/9	£1	19/-
Cerebos: Ord.	6	£1	5¾
Chivers: 6% Deb.	101½	£100	102
Cinzano: 7½% Pref. ...	20/9	£1	21/-
Clark's Bread: Ord. ...	21/3	10/-	22/8
Cow and Gate: 7½% Pref.	22/6	£1	22/7
Criterion Restaurants: Ord.	6/9	5/-	6/3
Crosse and Blackwell: Ord.	11d.	1/-	5½d.
7½% Pref.	4/-	15/-	4/6
6½% Deb.	77¾	£100	78
Dutch Margarine: 5½% Pref.	20/9	£1	21/-
English and Dutch Meat:			
8% Deb.	52	£100	51
Ewart and Son: Ord. ...	10/6	5/-	10/3
16% Pref.	19/-	10/-	19/3
Foster Clark: Ord.	33/6	10/-	42/3
Fry's: 8% "B" Preferred	22/9	£1	23/-
Fullers: Ord.	35/-	£1	34/6
7% Pref.	21/6	£1	21/9
Gordon Hotels: Ord. ...	4/6	£1	7/-
4% Perp. Deb.	66½	£100	67
H.P. Sauce: Ord.	82/6	£1	85/9
Hill (W.): Ord.	5/9	£1	5/6
Holbrooks: Ord.	12/6	5/-	12/3
5% Pref.	4½	£5	4½
Home and Colonial: Ord. ...	13/6	4/-	12/9
15% Cum. Ord.	45/7	£1	49/-
6% Cum. Pref.	5⅝	£5	5¾
Honywood Hotels: Ord. ...	3d.	2/6	1/8
8% Pref.	9/6	£1	12/6
Hovis: 6% Cum. Pref. ...	22/6	£1	22/9
Imperial Chemical: Ord. ...	13/6	£1	11/9
Deferred	3/3	10/-	3/-
7% Cum. Pref.	18/4	£1	18/-
International Tea: Ord. ...	20/-	5/-	20/-
6% 1st Pref.	22/6	£1	23/6
7% "A" Pref.	25/-	£1	25/8
Jones (R. E.): Ord.	1/6	5/-	1/3
10% Pref.	6/9	£1	6/10
Jurgens:			
7% Cum. Partg. Pref. ...	20/-	£1	23/-
Kia-Ora: Ord.	7/-	10/-	6/6
Liebigs: (Reg.)	9	£5	8¼
(Bearer)	8¼	£5	8¼
5% Pref.	92/3	£5	92/6
Lipton: Ord.	5/9	1/-	5/6
5% 1st Pref.	8/6	10/-	8/9
6% Pref.	11/3	10/-	11/6
6% Deb.	102½	£100	103
Lovell and Christmas: Ord.	13/-	£1	11/6
Lyons: Ord.	97/6	£1	89/-
"A" Ord.	95/3	£1	86/-
5% Pref.	21/-	£1	21/6
6% Preferred Ord. ...	22/3	£1	22/6
7% Pref.	25/-	£1	27/-
8% Pref.	28/3	£1	30/9
Manbre and Garton: D'f'd.	10/8	2/-	13/-
Mather and Platt: Ord. ...	24/6	£1	21/6
Maypole Dairy:			
20% Preferred	16/9	5/-	17/-
Deferred	4/-	2/-	3/9
5% Pref.	19/3	£1	19/6
Mazawattee Tea: Ord. ...	11/3	6/8	11/-
Meadow Dairy: 7½% Pref.	23/9	£1	24/6
Mellin's Food: 6% Cum. Pref.	2/6	£1	2/6
Molassine: 7% Pref. ...	11/9	15/-	12/6
Nathan (J.): Ord.	1/3	1/-	1/2
7% Pref.	14/9	£1	15/-
8% Preferred	5/9	10/-	5/10
Nestlés: 8% Pref.	24/-	£1	27/6
Parkinson and Cowan: Pref.	16/3	£1	16/-
Pascall (J.): 8% Preferred	1/6	£1	5/8
Peak Frean: 5% Pref. ...	18/9	£1	18/3
8% "A" Pref.	26/-	£1	26/-
Radcliffs Edible: Ord. ...	1/3	1/-	1/1
8% Pref.	7/-	10/-	6/10
Radiation: Ord.	32/6	£1	31/-
6% Pref.	21/6	£1	22/-
Rowntree: 7% 2nd Pref. ...	21/6	£1	21/8
Salt Union: Ord.	23/2	£1	22/6
7% Pref.	24/6	£1	27/9
4½% Deb.	83	£100	83¼
Schweppes: Deferred ...	18/8	£1	18/6
4% Deb.	77	£100	77
Scribbans: Ord.	12/9	£1	11/6
Deferred	1/10	1/-	1/6
Slaters and Bodega: Ord. ...	26/-	£1	25/6
6½% 2nd Pref.	20/3	£1	20/6
Smithfield and Argentine Meat:			
7½% Cum. Pref.	15/6	£1	15/3
Smith's Potato Crisps: Ord.	6/4	5/-	7/6
Spiers and Pond: Ord. ...	11/3	10/-	11/-
6½% Pref.	20/9	£1	21/-
5% Deb.	96	£100	96
Spillers: Ord.	29/-	£1	28/-
6% Pref.	20/9	£1	21/-
Deferred	12/-	£1	12/-
Strand Hotel: Pref'd. Ord.	63/6	£1	63/3
Tate and Lyle: Ord. ...	38/-	£1	33/-
6½% Pref.	23/9	£1	24/-
Trust Houses: Ord. ...	14/-	£1	13/6
Unilever: Ord.	27/9	£1	27/-
7% Preferred	21/3	£1	23/-
Union Cold Storage:			
6% Pref.	18/-	£1	21/-
7% Pref.	18/9	£1	21/6
10% Pref.	24/-	£1	27/3
United Caterers: Ord. ...	9d.	5/-	8d.
United Dairies: Ord. ...	34/-	£1	32/9
6% Pref.	21/-	£1	23/-
United Glass Bottle: Ord. ...	18/-	£1	17/9
Preferred	23/-	£1	23/-
United Molasses: Ord. ...	6/6	£1	8/-
6% Pref.	9/-	£1	9/3
Van den Berghs:			
15% Preferred Ord. ...	8/6	5/-	9/3
Victoria Wine: Ord. ...	5/-	5/-	4/9
8% Pref.	20/3	£1	20/3



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Latest Patent Applications

25075. GLOUCESTER INCUBATOR CO., LTD., and WRENTMORE, G. W.: Food-mixing appliances. September 7.

25466. POSTON, W.: Devices for steaming and roasting food material. September 11.

Specifications Published

357,515. FORRESTER, H. J. C. (KELLOGG CO.): Method and apparatus for treating food materials.

356,794. KELSEY, T. S.: Treatment of cereals and other starch-containing food substances.

356,151. CHRISTIANSEN, E., and ERICSSON, C. O.: Means for intermittently delivering jam, custard, or other material in predetermined quantities.

356,385. BALDWIN, M. J.: Drying apparatus suitable for the drying of tea and other materials.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

LEEDEEN.—522,500. **Tinned fish.** AKTIESELSKAPET LEDA CANNING CO., LTD., 63, N. Dalgate, Stavenger, Norway. October 7.

PRIORY.—524,298. **Toffee.** THE PRIORY, LTD., 115, North Station Road, Colchester, Essex. October 7. (Associated.)

OCH AYE.—524,540. **Biscuits and cakes.** BROADHURST AND CO., (GADBROOK), LTD., Gadbrook Biscuit and Cake Factory, Gadbrook, Northwich. October 7.

THREE STAR.—524,554. **Sweetmeats, but not including assorted chocolates.** BATGER AND CO., LTD., 102, Brook Street, Ratcliffe, London, E. 1. October 7. (By Consent.)

REVEIL.—524,891. **Canned vegetables and canned fruits.** The firm trading as CHARLES GODCHAUX AND SONS, 44, Bow Lane, Cheapside, London, E.C. 4. October 7.

SUZERAINE.—525,420. **Sardines.** SOCIEDADE PENINSULAR D'IMPORTACAO E EXPORTACAO, LIMITADA, Rua Serpa Pinto No. 6, Portimao, Portugal. October 7.

JIFFI.—525,551. **Tea, coffee, and cocoa.** GEORGE PAYNE AND CO., LTD., 21 to 24, Queen Elizabeth Street, Tower Bridge, London, S.E. 1. October 7.

HOT-POT.—525,552. **Tea, coffee, and cocoa.** GEORGE PAYNE AND CO., LTD., 21 to 24, Queen Elizabeth Street, Tower Bridge, London, S.E. 1. October 7.

GNUTEX.—523,364. **Edible fats.** THE SOUTHERN OIL CO., LTD., Westinghouse Road, Trafford Park, Manchester. September 30.

HONEY GROVE.—521,872. **Canned and bottled fruit, canned and bottled vegetables, flour, jam, marmalade, and lemon squash.** G. BOWLES NICHOLLS AND CO., LTD., 18, King Street, Snow Hill, London, E.C. 1. September 30. (Associated.) (By Consent.)

ORBIT.—524,424. **Margarine and edible fats.** JOHN MELVIN AND CO., LTD., 34-36, King Street, Glasgow, C. 1. September 30.

MEADOW.—524,430. **Canned fish, canned vegetables, and canned fruits.** MEADOW DAIRY CO., LTD., 179 to 189, City Road, London, E.C. 1. September 30. (Associated.)

BENEDICT.—525,382. **Peas for food.** JOSEPH BLOWER DRING, The Model Factory, Norfolk Street, Boston, Lincolnshire. September 30.

MORNSIDE.—525,269. **Tea and coffee.** FERGUSON, HOLNESS AND CO., LTD., Oxford House, 15, John Street, London, E.C. 3. September 23.

ENA.—523,804. **Preserved fish.** ERNEST HUGH WELFORD, 10, Eastcheap, London, E.C. 3. September 23.

VI-TEA.—524,624. **Tea.** ALFRED BUTTON AND SONS, LTD., Metropolitan Depôt, Belmont Road, Uxbridge, Middlesex. September 23.

MANDURA.—522,805. **Tea.** G. DEMPSTER AND SON, 19-23, Main Street, Bridgend, Perth. September 23. (By Consent.)

MAZOVO.—524,060. **Cereals and cereal products for food.** JOHN HERDMAN AND SONS, LTD., Haymarket Mills, 113-115, Haymarket Terrace, Edinburgh. September 16.

VI-FEX.—524,732. **A food composed principally of milk, flour, and malt, and flavoured with cocoa or other ingredients, for making a non-alcoholic beverage.** NESTLÉ AND ANGLO-SWISS CONDENSED MILK CO., Cham and Vevey, Switzerland, and St. George's House, 6 and 8, Eastcheap, London, E.C. 3. September 16. (By Consent.)

OLYMPIC.—524,395. **Tea.** The firm trading as DIRECT TEA SUPPLIES, 32, Staveley Road, Chiswick, London, W. 4. September 16.

SUNTIPT.—524,446. **Flour.** BURTON'S BAKERIES, LTD., 49 to 53, Cromwell Road, Holloway, London, N. 19. September 16.

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